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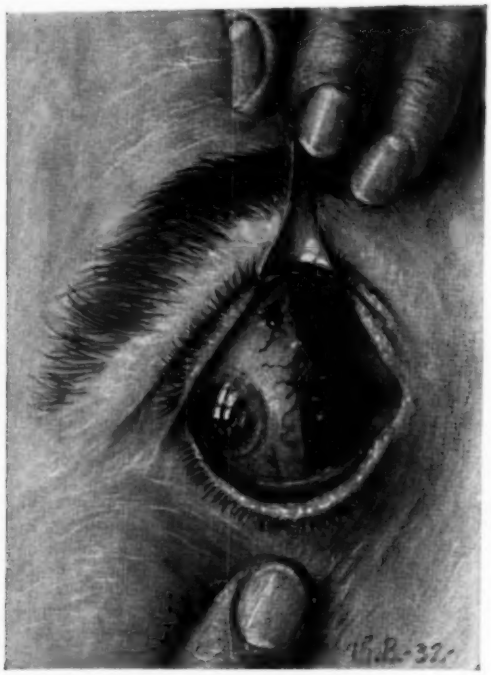

FIG. 1. (MOTTO)
HEMANGIOMA OF THE CONJUNCTIVA. LIDS RETRACTED SHOWING THE EXTENT AND ATTACHMENT OF THE TUMOR

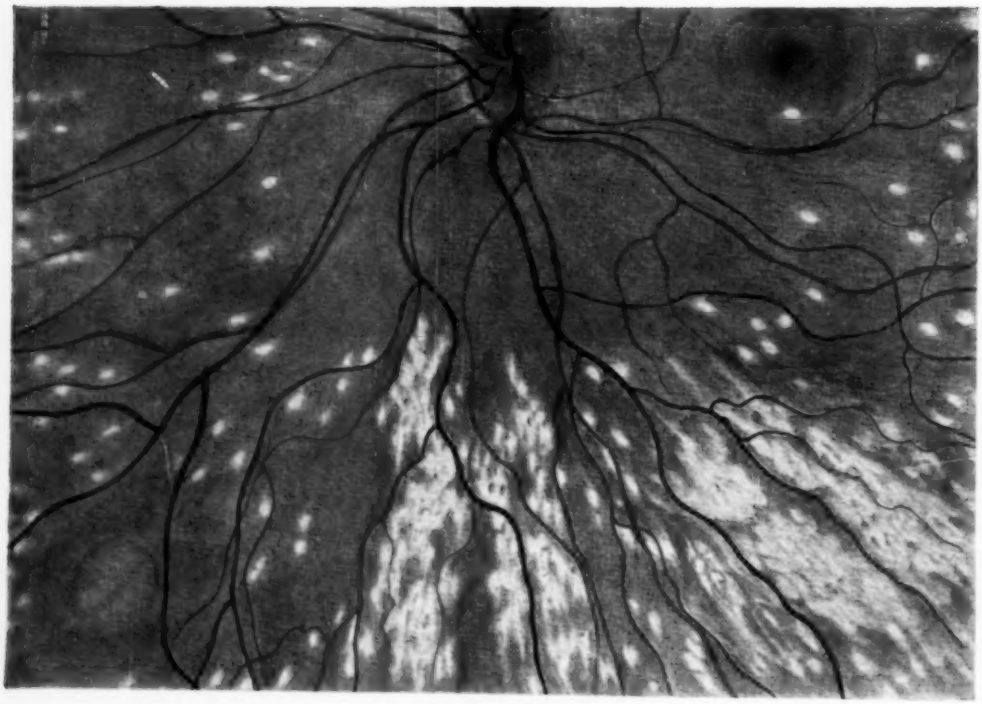

FIG. 2. (PILLAT)
RIGHT FUNDUS IN WILSON'S DISEASE.

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CHANGES OF THE EYEGROUND IN WILSON'S DISEASE (PSEUDOSCLEROSIS)

A. PILLAT, M.D.
PEIPING, CHINA

In a typical case of this disease there were unusual changes in the fundi which are thought to have been associated with degeneration of the retina and are described in detail. The literature of pseudosclerosis is reviewed.

In the literature on Wilson's disease and pseudosclerosis (Westphal-Strümpell) there is no mention of changes of the eyeground. On the contrary, it is stated that the absence of fundus changes is one of the characteristic signs, which, among others, makes possible the differential diagnosis between this disease and multiple sclerosis, in which a degeneration of the papillomacular bundle and subsequent pallor of the disc is frequently found in association with central scotoma.

It may be of interest, therefore, to communicate the fundus findings in a typical case of Wilson's disease which was observed recently in the Neurological Department under Dr. de Vries of the Peiping Union Medical College Hospital, and in which we were called for consultation on the eye condition.

A farmer, twenty-four years of age, had been suffering from a tremor of the entire body for the past ten months. The family history was negative. The patient was unable to walk or stand without collapsing immediately. A very strong tremor interfered with all intended movements. (For complete record of this case, see Cheng, Y. L.[1])

Ocular symptoms: The eyes were normal externally. The movements were free in all directions and coordinated; the position of the eyeball was normal.

The cornea had its normal luster but at its posterior surface a Kayser-Fleischer's ring was seen, in a beginning stage and somewhat different from its usual shape. This green-brown ring could be seen, with the naked eye, only at the upper and lower circumference of the cornea, and at its thickest diameter was approximately 1½ mm. in width. Towards "3 o'clock and 9 o'clock" the upper and the lower sickles ended in points, which just touched. With the slitlamp the pigment ring was easily localized in Descemet's membrane; it began just at the limbus, was a distinctly even brown, and faded away towards the center of the cornea in a bluish-gray hue. At "3 o'clock and 9 o'clock," where the two sickles joined each other, only the bluish-gray color was seen. Under higher magnification the ring consisted of very minute stipples. The central parts of the cornea were entirely normal, except for a few isolated, brown, pigment deposits on Descemet's membrane.

The iris was brown, and its structure was hidden behind a very dark and dense superficial pigment layer; the pupillary pigment margin was visible and intact. The pupil became fully dilated after homatropin instillation.

The lens was normal. No opacities, no brown color in or underneath the capsule similar to that at the posterior surface of the cornea could be seen. The shagreen was normal, too. Also no trace of a "sunflower-like cataract" as described by Siemerling and Oloff[2], like the so-called copper cataract, was seen in my case.

The fundi were more interesting. In the right fundus the vertical oval disc was redder than normal and slightly indistinct in outline, due to a mild, general haziness of the entire retina. The color and the outlines of the disc resembled somewhat those encountered in advanced cases of medullated nerve-

fibers, where the blurring and the color of the disc is due to a superficial glial film covering the nervehead.

The retinal vessels did not differ from those in a normal fundus, the proportion of veins and arteries being normal and no signs of changes of the vascular walls being visible. The small vessels could be traced as far as the periphery, except in the upper half of the fundus where the general haziness of the retina somewhat blurred the small end-branches.

The macula lutea was normal, but the margin of the fovea was indistinct and no reflex was seen on account of the dullness of the retina, At the upper margin of the fovea there was a white spot of 1½ vein-diameters.

These white spots formed the characteristic feature of the eyeground, as shown in frontispiece. They lay chiefly nasal to the disc and above and temporal to the fovea, and were much more numerous in the upper half of the fundus than in the lower. In the neighborhood of the disc they were isolated and irregularly scattered, while toward the periphery they became more numerous, forming large, white-gray areas, in which the individual spots were still visible. Most of the spots varied between one and two vein-diameters in size. They were round or oval when standing isolated, and oblong and irregular when standing together. Their color was white, with a tinge of gray, especially noticeable at places where they were crowded. The outlines were generally blurred, only a few spots near the center of the fundus being rather sharply defined. Most of the individual spots were outlined by a gray border or a small gray halo. Around the conglomerated dots there was a distinct grayness not only around the whole area but also among the various groups of indistinct dots. This blurred gray color is hard to describe, but it may be compared to watercolor painting on a wet ground where the colors flow into one another and mix. Here and there was a small area in which only the indistinct gray spot was seen at the fundus while the white center was missing.

Among large plaques or sometimes among certain parts of them, a certain gray-red was seen (note the left upper sector of frontispiece). This was in my opinion a thinning of the severely degenerated retina through which the choroidal color shone more distinctly than elsewhere in the fundus.

The retina as a whole looked gray-red in the entire upper part, and was distinctly redder and more transparent than that in the left eye of the patient or in the lower half of the right eye, which was less affected than the upper. This grayness was undoubtedly the sign of a diffuse degeneration of the retina, which, next to the white spots, was the second important point in our patient's fundus.

The retinal vessels did not show the slightest relation to the white dots. The spots were not arranged along them nor did the course of the retinal vessels seem to be influenced by the dots. The retinal vessels almost invariably lay in front of the dots.

The gray patch in the right upper quadrant (see frontispiece) was a choroidal nevus, incidentally found.

The white dots in our case were most numerous and crowded in the temporal and upper sector, less numerous in the nasal upper sector, and only sparsely found in the lower part.

The choroidal vessels were indistinctly seen in the lower half of the fundus, while in the upper half, here and there, a suggestion of them could be recognized.

The left fundus was much less affected than the right. Only three groups of dots were seen, one in the upper half, and two at the nasal side, each consisting of from four to seven dots, surrounded by the gray retina. But the disc here also was blurred and the entire retina seemed to be less transparent than a normal one.

The vision was O.D. 6/20; with —1.D.sph. ⌯ —2.cyl. ax. 180° V. = 6/10; O.S. 6/20; with —1.D.sph. ⌯ —2.cyl. ax. 180° V. = 6/6. The near vision was O.D. Jaeger 2; O.S. Jaeger 1.

The visual field showed normal outlines, with a test object 10 mm. in size. When the illumination was reduced, the field showed a concentric contrac-

tion for red and blue of 15-20°. Finer examinations of the visual field were impossible on account of the numerous fits and tremors of the entire body, which arose each time the patient tried to concentrate his attention.

The dark adaptation measured with the five-point adaptometer of Birch-Hirschfield showed O.D. 1/6 normal; O.S. almost normal.

Discussion

A Chinese patient, twenty-four years old, with a typical case of Wilson's disease (pseudosclerosis Westphal-Strümpell) showed fundus changes characterized by (1) the presence of white dots in extended areas of the retina, and (2) a diffuse progressive degeneration of the retina. The whole disease was retinal; the choroid was found unaltered. Fleischer[3] speaks of a possible pigmentation of the lamina vitrea of the choroid similar to the pigmentation of the posterior surface of the cornea. I have given special attention to that point, but I could not find any evidence of it as far as the ophthalmoscopic examination was concerned. The color difference between the upper and lower fundus in the right eye, and between the left eyeground and the upper half of the right, can be explained simply by the more advanced state of retinal degeneration. It is the same gray haziness found in other fundus diseases with atrophy of the retina, such as retinitis pigmentosa and old thrombosis or embolism of retinal vessels.

The literature on Wilson's disease at my disposal, in which a closer examination of the eye was made is as follows: Fleischer, Br., 1922[3]; Söderbergh, G., 1922[4]; Siemerling and Oloff, 1922[2]; Kehrer, 1922[5]; Jess, A., 1922[6]; Kubik, J., 1922[7]; Twelmeyer, O., 1923[8]; Jendralski, F., 1923[9]; Jaksch v. Wartenhorst, 1923[10]; Metzger, 1924[11]; Gala, A., 1925[12]; Vogt, A., 1929[13]; Weger and Natanson, 1929[14]; Melanowski, W. H., 1929[15]; Poe, D. L., 1930[16]; and Rauh, W., 1930[17]. In all of these reports the eyegrounds are either described as normal or are not mentioned at all. Söderbergh, G.[4], is the only one to mention a questionable pallor of the discs of both eyes. It is worthy of note that Galla, A.[12], found in his case a night-blindness, although associated with xerosis conjunctivæ. It seems that most of the authors were fascinated by the interesting phenomenon of Kayser-Fleischer's ring of the cornea, and paid but little attention to the fundus. Also in the Handbuch der inneren Medizin by Mohr u. Staehelin (v. 5, part 1, p. 310), nothing is mentioned about the eyegrounds. This was also the case in the pre-war literature where pseudosclerosis had not yet been sufficiently studied.

The location of the dots inside the retina should be mentioned. They certainly do not lie in the innermost layer, for they are never found in front of the retinal vessels which, as mentioned previously, always go unaltered over the dots. Furthermore, the dots do not lie in the outermost layers of the retina or in the lamina vitrea of the choroidea, because of the absence of pigment changes around or in the neighborhood of the spots and larger plaques. In my opinion, they lie in the middle layers of the retina.

Whether the findings of the eyegrounds reported in this case are typical of Wilson's disease or not, only time can tell. But there are in my opinion two points that indicate the close relationship of this fundus disease to the general disease, 1, the close relation of the brain and the eye, and therefore also of brain disease and eye disease; 2, the fundus disease described differs from all known retinal diseases.

1. Wilson's disease is characterized by pathologic-anatomic changes in the brain, the liver, and the cornea (Goldstein, K.[18]). Wilson himself describes the disease as a bilateral symmetric degeneration of the putamen and of the globus pallidus. The finer histologic changes in the brain are not yet sufficiently identified, but it is since the publications of Spielmeyer[19], that Alzheimer and von Hösslin[20] found "giant glia cells" in corpus striatum, thalamus opticus, and nucleus dentatus of the cerebellum, and absence of ganglion cells in the cortex. Such widespread lesions in the brain suggest their presence

also in the eye, which is nothing but a part of the brain. But since the lesions in the brain are irregularly developed in various cases, and since sometimes one region is more altered than others, there may be cases of pseudosclerosis with changes in the retina and others without them. A careful search of the eyeground in cases to come will be necessary. Ophthalmoscopic examination should be made with a good electric ophthalmoscope using the direct image, for with indirect examination the dots, which are sometimes few and isolated, may easily escape attention. In my opinion patients with Wilson's disease whose fundi are darkly pigmented, will more easily show the fundus changes, as the contrast between the background and the gray-white dots is marked. In general, early spotted retinal degeneration in fundi of pigmented races shows itself more frequently than in light-complexioned races, which in my opinion explains the fact that almost all cases of retinitis pigmentosa in Chinese show thousands of gray-white spots between the bone-corpuscle-shaped pigment. This has been mentioned before in this journal[21] but it is seldom seen in cases of retinitis pigmentosa in Europe. Such dots, similar or identical to the dots in retinitis punctata albescens, are a common feature of almost every case of retinitis pigmentosa which I have seen so far in the Orient.

Whether the white dots seen on the eyeground in our case are parallel to spots of degeneration in the brain or whether they are clefts and cysts (Spielmeyer[19]), filled with some degenerative material, only future histologic examination of such an eyeground can prove. The diffuse degeneration of the retina might also be regarded as parallel to the degeneration of large parts of the brain. The degeneration and the altered function of the retina become evident not only by ophthalmological examination, but are proved by the decrease in visual acuity and especially by the decrease of the light-sense shown as nightblindness. Nightblindness in pseudosclerosis or Wilson's disease has been mentioned only three times in the literature, by Fleischer[8], Gala[12], and Metzger[11]. Gala's case also showed a xerosis of the bulbar conjunctiva which leads him to attribute the nightblindness to a simultaneously existing vitamin A deficiency. Fleischer associates the nightblindness in his case with a hypothetical pigmentation of the lamina vitrea of the choroid similar to that of the posterior surface of the cornea. Metzger only mentions a disturbance in adaptation in his case, without giving any explanation. In our case the nightblindness seems amply explained by the presence of retinal degeneration, because it is more severe in the right fundus where the changes are extensive, and is almost absent in the left fundus where the retinal degeneration is in its beginning. Cases with nightblindness should be carefully examined with a good ophthalmoscope. Nightblindness, however, can precede an anatomical or ophthalmoscopic change and may be simply the sign of a functional disturbance of the retina. This point deserves careful study in the future.

It is to be expected that the visual field will show a definite change corresponding to the affected part of the retina. This is not true in our case, and may be explained by the impossibility of making a visual field examination which could be regarded as even approximately accurate. The fits and convulsions of the entire body always set in when the patient tried to concentrate his attention on the test.

2. There is in my opinion no other fundus disease which might be confused with the one under discussion. White dots and a degeneration of the retina which are far from resembling this condition may be found (a) in the various types of retinitis externa, such as retinitis circinata, retinitis albuminurica and arteriosclerosis, (b) in the so-called "Drusen bodies" (retinitis guttata of Nettleship), and (c) in retinitis punctata albescens. But there are significant and unmistakable differences between all these diseases and our present case. Retinitis circinata is always somewhere around the center of the fundus and the dots are arranged in ring form. The white dots appearing

in retinitis albuminurica, in high blood pressure or arteriosclerosis, are also localized chiefly in or near the centre of the eyeground and disappear toward the periphery, whereas in pseudosclerosis the dots increase in number toward the periphery. Besides this, all vascular changes are missing in our case, and are apparent in others. In von Hippel's disease (angiomatosis retinae) white spots are seen, but the retinal vessels are characteristically altered.

Drusen bodies, hyaline excrescences of the lamina vitrea, from a distance may resemble the dots shown in our picture. But they are yellower, would hardly appear in such numbers in a man twenty-four years old and are always more numerous in the center and seldom seen in the periphery. Furthermore, they do not show such a massive conglomeration and certainly no degeneration of the retina between them. On the other hand, thin pigment-rings are frequently found around the hyaline bodies, but these are entirely absent in our case.

In retinitis punctata albescens, both eyes are equally or similarly involved at the eyeground, the indistinct dots are usually not as white and distinct as in our case, and the dots are more evenly distributed throughout the periphery and later in the center of the fundus also. No case is known to me in which such a spot-shaped accumulation of dots has taken place as seen in our picture.

Summary

In a typical case of Wilson's disease (pseudosclerosis Westphal-Strümpell) with a Kayser-Fleischer's pigment-ring in both corneae, a rather peculiar and hitherto undescribed fundus disease is reported.

The fundus disease is characterized chiefly by two points: (1) the presence of white dots either isolated or conglomerated in the middle or outer layers of the retina, which increase in numbers towards the periphery, (2) a markedly diffuse degeneration in those parts of the fundus in which the white dots lie.

The retinal vessels are unaltered. So also are the macula and the choroid.

The two fundi are very differently affected, the right much more than the left.

The presence of nightblindness in the more seriously affected eye points to a local degenerative process of the retina.

Parallelism of changes in the various parts of the brain and of the eye is suggested.

The differential diagnosis between this fundus disease and other fundus conditions associated with white dots in the middle and outer layers of the retina is briefly discussed.

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AN UNUSUAL CORNEAL LESION, PROBABLY CONGENITAL AND FAMILIAL IN CHARACTER

A slitlamp study

G. E. DESCHWEINITZ, M.D. AND ALFRED COWAN, M.D.

A congenital familial corneal condition occurring in three members of one family is described. The lesion consisted of multiple drop-like spots in the anterior parenchyma. Read before the American Ophthalmological Society at New London, Connecticut, June 27, 1932.

This communication concerns itself with unusual corneal lesions which we have had the opportunity of observing in three members of one family, father, son and one daughter, the two others, mother and youngest son being unaffected, and in one other patient, a man kindly referred to us by Dr. Charles A. Rankin, with permission to use his notes in this paper.

We adopt the word "unusual" and avoid the phrase "not previously observed or recorded", because although it is unlikely that the lesions we have studied have escaped the attention of other investigators, we have been unable to find any description in the literature, or any of the slitlamp atlases which corresponds exactly with the corneal changes we have examined and now report.

Cases

Family Group. a. Father, aged forty-eight years, of good physique; nothing of importance in his history except that during the late war he had an attack of "temporary blindness" (cause unknown), and was thoroughly generally examined, but "nothing found"; Wassermann test negative. He reported December 24, 1929, for correction of his refractive error which proved to be:

O.D. — 0.50 D.sph. ⌯ + 2.25 D.cyl. ax. 90°. v = 6/7.5.

O.S. — 0.75 D.sph. ⌯ + 2.50 D.cyl. ax. 60°. v = 6/6.

Esophoria 1$^{\Delta}$, rod test.

Numerous subepithelial dot-like lesions were present in each cornea, presently to be described in detail. Fundi exhibited no abnormalities, save only a slight grayness of the discs. Visual fields ($\frac{10\text{ mm.}}{330}$ white test-object) normal.

b. Eldest son, aged seventeen years, in normal health, came January 2, 1930, for correction of his refractive error, the result after homatropin cyclopegia being:

O.D. + 3.50 D.sph. ⌯ + 1.00 D.cyl. ax. 120°. v = 6/6.

O.S. + 3.00 D.sph. ⌯ + 0.50 D.cyl. ax. 120°. v = 6/6.

Esophoria 1$^{\Delta}$, rod test; left hyperphoria 1/2$^{\Delta}$; no lesions in the eyegrounds; corneal condition exactly like that of his father.

c. Daughter, a well-built girl aged sixteen years; had worn glasses since childhood for the correction of a convergent squint, but not constantly, having been advised by a Continental oculist to discontinue their use. She had always suffered considerable asthenopia, headache and dread of light; nothing important in her general history. Her refractive error was as follows:

O.D. + 3.75 D.sph. ⌯ 0.75 D.cyl. ax. 105°. v = 6/6.

O.S. + 4.75 D.sph. ⌯ + 2.00 D.cyl. ax. 90°. v = 6/22.

Although the cover test indicated a slight inward deviation, the Maddox rod demonstrated exophoria 11$^{\Delta}$, the Maddox wing test an exophoria of 10$^{\Delta}$ and right hyperphoria 3$^{\Delta}$. The convergence near point was defective in that outward deviation of the left eye occurred on efforts at close convergence.

The corneal lesions corresponded precisely with those of her father and brother.

Each fundus revealed a small oval physiologically cupped disc, and on the nasal side of each disc a narrow congenital crescent; general area of the eyegrounds negative.

The corneæ of the mother and youngest member of the family, a boy, as previously stated, were normal.

The boy member of the family group had been examined by Dr. John Burke in 1917 and by Dr. Morrison in 1922 in Washington, for the correction of refractive errors. No note was made of any fundus lesions or loss of transparency of the media.

Fig. 1. Optical section through the cornea showing the location of the lesions in the neighborhood of Bowman's membrane.

The girl was seen by Dr. John Burke in 1917 and later by Dr. W. H. Wilmer, to whom we are indebted for the following record:

O.D. + 4.00 D.sph. ⊂⊃ + 1.00 D.cyl. ax. 90°. v = 20/30.

O.S. + 4.00 D.sph. ⊂⊃ + 1.50 D.cyl. ax. 90°. v = 20/100.

Convergent squint, O.D. fixing eye; fusion faculty (?)—deviation at 13″ = 10Δ.

They did not study the patient's corneæ by means of the slitlamp, as this instrument was not available on these occasions.

Dr. Louis S. Greene examined the girl of this group in March, 1927, and writes: "The slitlamp showed dot-like lesions in the epithelium; also in the substantia propria, a condition which resembled somewhat the faint remains of a previous interstitial keratitis." Referring to the boy, examined September 14, 1927, he states that his record reads "the cornea under the slitlamp shows the same condition as his sisters's and is evidently a congenital condition."

Dr. Rankin's Case. Dr. Rankin has kindly furnished the following notes: "J. E. A., a man aged sixty-eight years, was first examined by my father September 3, 1906, for the correction of his refractive error, at which time the patient was forty-three years old. These examinations were repeated several times, the last one having been made in 1924. During this period there was no note of any corneal lesion, since slitlamp examinations were not made.

Dr. Charles Rankin examined the man April 29, 1930, Dr. Faught having sent him for a fundus examination because of high blood-pressure; 190 systolic.

The ophthalmoscope revealed a moderate retinal angiosclerosis. The visual acuity was 6/5 in each eye with correction. With the slitlamp Dr. Rankin noted the same corneal lesions which we had found in the family group. This patient was later also examined by us and this observation confirmed, and likewise by Dr. William Zentmayer.

Dr. Charles Rankin studied this patient's son with the slitlamp, but discovered no corneal lesions; a granddaughter was investigated by another ophthalmologist, who reports "no abnormal corneal conditions". Whether the slitlamp was used we are unable to state. A daughter of the patient could not be examined as she lives in the far west.

Slitlamp study. In each case both corneæ are affected and the condition in each instance is practically precisely similar. The numerous lesions are more or less evenly distributed over the whole area of each cornea, but somewhat more densely in the central portions. With the narrow slit they are seen to lie in two or three planes which are very close together either in or immediately beneath Bowman's mem-

brane. The corneal epithelium is not involved and the surface of the cornea is perfectly smooth and regular.

By direct illumination the lesions appear to be well-defined, solid gray, plaque-like spots of various sizes and shapes, the largest ones measuring about 1/12 of a millimeter across. They seem to be so superficial as to lie on the surface of the cornea, although, in fact, they are placed beneath it.*

against the red fundus reflex in the pupillary space. They are not stained green by a fluorescin solution; they do not interfere with direct vision. The sensitivity of the cornea is not reduced.

Comment

Bruno Fleischer[1], A. Lutz[2], and Annie Vogels[3] have reported unusual and interesting corneal lesions which closely resemble each other.

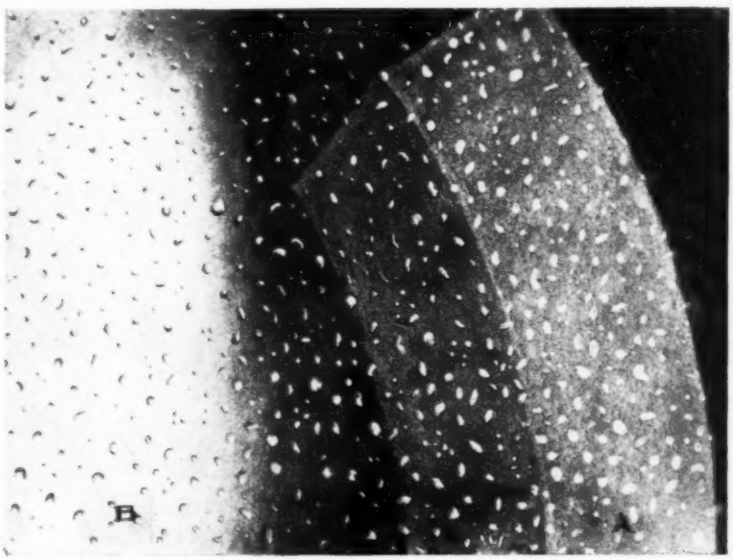

Fig. 2. At A, on the face of the corneal block, the lesions appear as solid gray plaques lying on the surface of the cornea, but they are actually transparent bodies when seen against the light reflected from the iris behind B.

By retroillumination they are seen to be optically clear areas, resembling rain drops on a window pane.

Some of the lesions, the smaller ones, are nearly spherical, but the majority of them are ellipsoid, ovoid or irregular in shape. There is no tendency to coalesce, and the cornea between and behind the lesions is normal. The endothelium is intact. There are no precipitates on the posterior surface of the cornea.

The lesions cannot be seen with the Zeiss binocular loupe; but examined with the ophthalmoscope and + 16 D.sph. they stand out as black points

Fleischer's patient was a woman aged thirty-seven years, the subject of multiple sclerosis, paralysis of the abducens and unilateral neuritic atrophy. In the middle of each cornea, symmetrically situated, there was a "breath-like" opacity suggesting the appearance of whirling hairs. Analysis of these opacities by proper illumination showed that they were composed of points or flecks of gold color with clear cornea between them, and that they were situated either in the anterior layer of the substantia proporia or in Bowman's membrane. The upper surfaces of the corneæ were free of the lesions and clear and shining. There was no change after a lapse of one and one-half years.

Lutz found exactly similar whorl-

* Dr. Greene when in 1927 he examined the girl member of the group recorded this fact; we did not find the faint lesions he noted in the substantia propria.

like opacities in the corneæ of a woman of fifty-three years and her daughter, equally produced in each cornea of the young woman, but only slightly developed in one cornea of the mother, while the other was exactly like that of the daughter.

Vogels' patient was a woman, aged sixty-six years. In each cornea whorl-shaped opacities, as in the previous case, were seen to be composed of gold-brown dots in all layers of the cornea. Their situation differed somewhat from that found in Fleischer's and Lutz's patients. Vogels regards the lesions as an unusual form of corneal dystrophy.

The general whorl-like appearances of these corneal lesions differ entirely from those which we report; also the gold or gold-brown color of the points which composed them.

In Fleischer's and Lutz's patients the situation of the lesions was similar to that which obtains in our cases. A suggestion of familial influence appears in Lutz's records, as both mother and daughter were affected.

Max Bucklers[4] has described a condition which he entitles "A new slitlamp observation on the surface of the cornea; sickle-shaped lesions of the epithelium".

The corneæ of his patient, a woman aged fifty-seven years, were apparently smooth and clear, but with the corneal microscope he found over the surface of the central portion of each cornea many sickle-shaped figures, regularly distributed. They were mostly isolated, but also occurred in pairs, and here and there in a chain-like form. The peripheral parts of the corneæ were clear; the size of the figures varied in width; the maximum length was .3 mm.

By direct illumination these hooks revealed a gray tone which stood out only faintly from the surroundings. The lesions were only (or best) seen by retroillumination. With this method (× 24) the lesions revealed a double contour. The convex border of each sickle was sharply defined, but the concave side melted into fine drops which resembled an extremely delicate bedewing. The substantia propria was clear. The endothelium was normal. The edges of the lesion stained with fluorescin. The sensitivity of the cornea was not reduced. Vision O.D. = 5/4, O.S. = 5/5 with correction. No bacteria were present. Otherwise the eyes were normal.

The lesions changed from time to time. All traces of the figures observed in January had disappeared by the beginning of February, but in the previously free areas a new crop of "sickles" had developed. The duration of the disease is unknown.

Bucklers considered this a previously unknown disease of the surface of the corneal epithelium as probably a neurotrophic or a degenerative process.

Although the lesions observed by Bucklers differ materially from those we are describing in that they were situated in, not under, the epithelium, accepted the flourescin stain and were not permanent, we have included them in this small survey of available literature because a few of those which we have observed and depicted somewhat resemble them in configuration, that is, are sickle-shaped.

Olga Sitchevska[5] has recorded the case history of a man, aged thirty-eight years, with defective vision of the right eye which he attributed to a slight injury six years before, when some paint or shellac was thrown against the affected globe.

Examination with the Zeiss loupe revealed numerous fine, round, grayish opacities, varying in size from that of a pinpoint to that of a pinhead. The opacities were deeply situated and diffusely spread over the entire cornea, except for a clear area from 2 to 3 mm. in width around the periphery. The dots were distributed at about equal distances from each other, being more numerous in the center of the cornea. There was no change in the surface and luster of the cornea; sensitivity was not diminished. The rest of the eye was normal.

The slitlamp indicated that the epithelium and Bowman's membrane were clear; no blood vessels. The opacities were located in the anterior layers of the substantia propria, and none was present in the deeper layers. The dots

showed no tendency to confluence and were separated from each other by clear areas. They were mostly grayish-white in color, with a few brownish dots in the center; all were refractile. The deep layers of the cornea and endothelium were free from disease; vision was 20/50 with correction.

The left eye was normal. General examination and laboratory tests gave negative results.

In spite of the history of trauma, Sitchevska expressed the belief that the condition was of congenital origin, and because of the limitation of the opacity to the parenchyma, that it had occurred during the cleavage of the mesodermic tissue.

Except perhaps that the situation of the lesion is somewhat analogous to those in the cornæ of our patients, there is no similarity; only one eye was involved, and the disposition of the small opacities was quite different.

Conclusion

It seems certain that the peculiar condition we have described is congenital in origin and probably familial in character, although perhaps not necessarily so in that the son of Dr. Rankin's patient was unaffected. However, one member of this family has not been examined, and it is uncertain if the granddaughter was examined with the slitlamp and corneal microscope.

We have no theory to advance as to the genesis of these lesions. It is interesting to note that all the affected members of the family group had high degrees of refractive error, the children hyperopic astigmatism and the father mixed astigmatism. One of them, the daughter, had congenital crescents on the nasal side of each disc. The corneal lesions produced no visual inconvenience.

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LIPEMIA RETINALIS

CECIL W. LEPARD, M.D.
DETROIT

One case is reported in detail as to the relationship of lipemia retinalis and the blood lipids and blood sugar. The typical fundus picture appeared when the blood fats rose above 4.25 percent and disappeared when they fell below 2.80 percent. From the Department of Ophthalmology, University Hospital, Ann Arbor.

The object of this paper is to show the relationship between the lipids of the blood and lipemia retinalis, and to confirm the work of Parker and Culler in determining the level of blood fats at which lipemia retinalis is recognized and at which it disappears. The results recorded are from a single case under observation for a period of eighty-one days, during which time daily ophthalmoscopic examinations were made. The fundus picture was first seen at the time when the lipemia retinalis was most pronounced and subsequently the condition was made to disappear and reappear by varying the amount of fat in the blood through the diet. The means by which this was accomplished and a report of the findings in detail will be published at a later date by Dr. Arthur C. Curtis of the Department of Internal Medicine, Medical School, University of Michigan, through whose kind permission the laboratory reports and study of this case were made possible.

Following the review of thirty-nine cases by Parker and Culler[1], two new cases have appeared in the literature. The first of these, by Lillian A. Chase, in 1931[2], gives the point at which lipemia disappears as approximately between 1.42 and 1.13 percent of blood lipids of the whole blood. McKee and Rabinowitch[3], in the second, stated that there was still some evidence of lipemia retinalis when the blood fat fell to 1.65 percent, and the fundus was not normal until it had decreased to 1.3 percent. Both of these cases occurred in young male adults, who while under treatment became sugar free.

Report of Case

F. P., white male, laborer, aged fifteen years, was admitted to the University Hospital August 6, 1931, apparently moderately ill, complaining of weakness, excessive thirst, hunger, polyurea, and sores over the body. He had been known to be diabetic since December, 1930. In a period of a few weeks he lost forty pounds in weight and in January, 1931, developed diabetic coma. Under treatment with insulin and a weighed diet, he improved, although still complaining of polyurea. The diet was followed for about six weeks, then disregarded. A month before coming to the hospital he first noticed yellowish papules appearing on the skin.

Physical examination revealed many pea-sized yellowish papules in the skin, most numerous where the skin was exposed to trauma. There were no other significant physical findings. Blood pressure was 110/60.

Laboratory examination on admission showed four plus sugar, three to four plus acetone and diacetic acid, and two plus albumin with no significant urinary sediment. The blood sugar was 370 mg. per 100 c.c. of whole blood with CO_2 combining power 34 volumes percent. Blood cells were normal in number and character. Ophthalmoscopic examination August 7: O.D. Media clear. Disc vertically oval; physiological cup central and deep; lamina cribrosa not seen; rings blurred above and below. The disc appeared ivory colored. The retinal arteries and veins appeared light ivory in color and were about one and one-half times the normal caliber. Both the larger and smaller divisions of the retinal arteries and veins could not be differentiated by color one from another. The veins were slightly larger in caliber and a little more tortuous in course. There was a faint central arterial reflex stripe. The macula looked normal; foveal reflex was present, but not as bright as normal. The whole fundus had a fine granular appearance and furnished a back-

ground on which the retinal vessels stood out sharply, making a striking fundus picture. O.S. Essentially the same as the right eye. Diagnosis: marked lipemia retinalis O.U.; xanthomata. Vision: O.D. 6/5-3; O.S. 6/5-4. The blood lipids on August 7 were 14.168 percent. Disappearance of the fundus picture was complete on August 15 when the blood lipids fell to 2.709. The difference in color of the arteries and veins could be detected on the third day after admission. The arteries appeared a more pink ivory color and the veins a bluish-gray. This difference was first noticed in the larger divisions of the central vessels while at the same time the smaller divisions of the arteries and veins were indistinguishable. On September 27 the first suggestion of recurrence was seen, when the blood fat had risen to 3.513. The findings on this day were as follows: O.D. Nerve head and fundus hyperemic and congested; rings indistinct; physiological depression central and deep. Veins had a slightly grayish cast and a tortuous engorged appearance. Arteries were normal. Return of the lipemia retinalis was gradual and it was not until October 7 that one could say lipemia retinalis was present, had he not been anticipating it. A definite yellowish-gray hue appeared most noticeably along the walls of the arteries and veins. The arteries were pink with an ivory cast and the veins were a light lavender in color. On this day the blood fat was found to be approximately 4.351. The picture was full blown on October 10, 1931. With the decrease in the lipids to approximately 2.969 percent, the lipemia retinalis disappeared. The xanthomata were gradually reduced until September 3, when they were about one tenth of their original size. They did not again return to their original size while the patient was under observation.

The table presented shows the blood

Table

Date	Blood Lipids: Percent	Fasting Blood Sugar Mg. per 100 c.c.	Weight in Kilos	Ophthalmoscopic Examination	Remarks
1931					
Aug. 6					
7	14.168	370	55.2	Lipemia retinalis (marked)	Whole blood settles out by 50 per cent as thick creamy serum.
8			55.2	Lipemia retinalis	
9			54.8	Lipemia retinalis	
10			55.8	Lipemia retinalis	
11	10.87	254	56.5	Lipemia retinalis	
12			55.9	Lipemia retinalis	
13			57.	Lipemia retinalis	
14	3.02	198		Lipemia retinalis still present	
15				Normal fundi	
16			61.1	Normal fundi	
17			62.5	Normal fundi	Xanthomata becoming smaller and softer.
18	1.776	208	61.5	Normal fundi	
19			61.	Normal fundi	Xanthomata reduced one-half in size.
20			62.1	Normal fundi	
21			63.6	Normal fundi	Edema of ankles.
22	1.92	102	62.3	Normal fundi	
23			61.4	Normal fundi	
24			60.2		Edema has disappeared.
25			60.6		Xanthomata much less numerous.
26	1.402	164	61.3		
27			61.6	Normal fundi	
28			60.2	Normal fundi	

Table (continued)

Date	Blood Lipids Percent	Fasting Blood Sugar Mg. per 100 c.c.	Weight in Kilos	Ophthalmoscopic Examination	Remarks
29			58.7	Normal fundi	
30			59.	Normal fundi	
31	1.794	133	57.2	Normal fundi	
Sept. 1			56.8	Normal fundi	
2			56.4	Normal fundi	
3			57.3	Normal fundi	
4	1.612	228	57.8	Normal fundi	Xanthomata are reduced in size 90 per cent.
5			56.	Normal fundi	
6			57.6	Normal fundi	
7			56.1	Normal fundi	
8	1.90	272	57.4	Normal fundi	
9			56.8	Normal fundi	
10			56.4	Normal fundi	
11			56.2	Normal fundi	
12	2.48	220	57.	Normal fundi	
13			56.4	Normal fundi	
14			55.5	Normal fundi	
15			56.2	Normal fundi	
16	2.04	258	56.3	Normal fundi	
17			56.4	Normal fundi	
18			56.3	Normal fundi	
19	2.372	302		Normal fundi	
20			56.	Normal fundi	
21			55.8	Normal fundi	
22			56.2	Normal fundi	
23	3.884	298	55.8	Normal fundi	
24			55.8	Normal fundi	
25			55.7	Normal fundi	
26	3.476	260	57.	Normal fundi	
27			56.2	Fundi hyperemic	
28			55.4	Fundi hyperemic	
29			55.	Fundi hyperemic	
30	3.624	260	55.1	Fundi hyperemic	
Oct. 1			55.	Fundi hyperemic	
2			55.	Fundi hyperemic	
3	4.250	263	55.2	Fundi hyperemic	
4			54.9	Fundi hyperemic	
5			55.7	Fundi hyperemic	
6			55.8	Fundi hyperemic	
7	4.351	268	56.1	Lipemia retinalis	
8			56.	Lipemia retinalis	
9			55.9	Lipemia retinalis	
10	6.405	244	55.4	Lipemia retinalis (marked)	
11			55.9	Lipemia retinalis	
12			55.	Lipemia retinalis	
13			55.3	Lipemia retinalis	
14	5.521	232	55.4	Lipemia retinalis	
15			55.5	Lipemia retinalis (decreased)	
16			54.8	Lipemia retinalis	
17			55.3	Lipemia retinalis	
28			56.8	Normal fundi	
19	1.080	270	57.5	Normal fundi	
20			57.8	Normal fundi	
21			61.	Normal fundi	
22	.952	217	61.1	Normal fundi	
23			59.5	Normal fundi	
24			58.	Normal fundi	
25			57.8	Normal fundi	
26	.664	172	58.		

sugar to be nearly constant but the blood fat and weight in kilos to be variable.

Summary: When the phenomenon of lipemia retinalis occurred, it was seen to be in direct relation to the amount of fat in the blood. In this case, lipemia retinalis was observed when the blood fats rose approximately above 4.250 percent and disappeared when they fell below 2.8 percent.

I am indebted to Dr. Walter R. Parker for his suggestions and kind permission to submit these findings.

1025 David Whitney building.

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HEMANGIOMA OF THE CONJUNCTIVA

Report of a Case

M. Paul Motto, M.D.
AND
Floyd L. Dunnavan, M.D.
CLEVELAND

The literature is reviewed and one case reported. The condition is rare. The tumor tends to extend so should be removed in infancy. From the Department of Ophthalmology, Lakeside Hospital, Western Reserve School of Medicine.

Our interest in the subject of hemangioma of the conjunctiva was aroused by a case recently treated in our clinic. The rarity of the condition prompted us to review the literature on this subject and present our case report. According to the records of the Lakeside Hospital covering a period of some thirty-odd years, the only other case of ocular hemangioma diagnosed and treated in this clinic was a case of retrobulbar hemangioma.

In 1897 Fehr[1] could collect only sixteen reported cases. Lagrange[2] in his classical work "Tumeurs de l'oeil" refers chiefly to the work of Fehr. In 1902 P. H. Adams[3] reported a case of hemangioma of the ocular conjunctiva associated with periodical attacks of subconjunctival hemorrhage. H. Gifford[4] in an article published in 1906 stated that although naevi of the skin of the lids are not uncommon and the dilatation of the vessels sometimes extends from the skin over into the conjunctiva, angiomata of the conjunctiva proper are among the rarest of new growths. In twenty-four years of ophthalmological practice he saw only one case of hemangioma, which he reported —a hemangioma originating from the caruncle of the left eye. Saemisch, as quoted by Gifford[4], reported thirty-two cases of this affection. In 1913 M. S. Mayou[5] reported a case of hemangioma of the ocular conjunctiva which the patient had noticed for only four months. Ralson James and R. S. Trevor[6] in 1918 reported two similar cases of hemangioma of the palpebral conjunctiva. In 1925 Victor Ray[7] reported two cases but these were hemangiomata of the epidermis of the lids rather than of the conjunctiva. In 1928 E. Schindler[8] reported four cases of hemangioma—endothelioma of the upper lid and orbit in infants. No other cases have been reported since this date.

In reading the literature on this subject one is apt to be confused by the various terms, angioma, hemangioma and hemangio-blastoma, which are interchangeable. While some hemangiomata are probably traumatic in origin, the majority are undoubtedly congenital according to deSchweinitz[9], re-

sulting from some congenital defect. Consequently, cases of this nature are brought to the attention of the physician very early in life.

Hemangiomata are usually met with on the globe, extending into the orbit, but they also occur on the plica semilunaris, lids, fornix, and caruncle. They may vary in size from that of a pinhead to several centimeters in diameter. They may be smooth, lobulated or pedunculated. They are of a dark red or purplish hue. Their consistence is usually soft and spongy but may be more firm, with an abundance of fibrous connective tissue stroma.

Ocular hemangiomata present few symptoms, the most common of which is a sensation of pressure on the lids or globe. They are seldom tender. Some are found to pulsate, depending upon the vascularity of the tumor. Some of them are erectile to a certain extent, increasing greatly in size when the head is held down.

Pathologically, as stated by Parsons[10], hemangiomata are classified as tumors of the blood vessels and are either capillary or cavernous. The vessels involved in ocular manifestations may be either conjunctival, scleral, muscular, or orbital. Histologically, capillary hemangiomata consist of convoluted capillaries with very little interstitial tissue. Cavernous hemangiomata are comprised of dilated blood vessels and spaces lined with a single layer of epithelium and are separated by a network or stroma of bands of fibrous tissue which may be very cellular or hyaline. The spaces usually contain masses of red corpuscles or fibrinous coagula or hyaline exudates. The blood spaces communicate with each other and are nourished by their own arteries which empty the blood into dilated veins. The density of the growth varies with the size of the blood spaces and the amount of the stroma. The blood contained within the spaces is the cause of the dark red or purple color of the growth. Histologically, hemangiomata are very much like lymphangiomata, which are simply dilated channels lined with endothelium. It is the difference in content of the spaces which alone differentiates the two conditions, the hemangiomata being filled with blood and the lymphangiomata with lymph. Hemangiomata are usually benign; some grow rapidly, others remain stationary or commence suddenly to grow.

As previously stated, hemangiomata are usually congenital in origin and are discovered in infancy. This is the most favorable time for treatment, for they can be easily dealt with by simple excision, with or without previous ligation, or by the application of a radium plaque. If they are neglected at this early age, they tend to increase gradually in size, especially as a result of trauma, and in adult life are more difficult to treat. Surgical removal is unquestionably the most efficient, rapid, and the safest method of treatment. This procedure may or may not be preceded by the passage of a double ligature through the base of the tumor. Electrolysis and electro-thermo cauterization have been recommended in their treatment. Injection of the tumor with various solutions has been advocated. Perhaps the best result recorded is that of Blessig[11] who cured an unusually large conjunctival hemangioma by several injections of perchloride of iron. At first he used a 12/100 solution but this caused such a violent reaction with intense pain, nausea, and vomiting that he later used only one-half this strength solution. In the course of a few months he obtained a perfect cure with no perceptible loss of tissue. This method of treatment, however, has been condemned by most authorities because of the possibility of fatal thrombosis and hemorrhage. This conclusion probably resulted from the unfortunate experiences of general surgeons in dealing with larger extra-ocular growths with larger injections of iron. Injection of these tumors with hydrogen peroxide, absolute alcohol, as described by Ball[12], and Wyeth's method of injecting boiling water have been used. These methods have proved to be unsatisfactory because of the extensive necrosis of tissue produced, danger of injuring the cornea directly, and danger of necrosis and suppuration of the cornea and sclera. Small superficial he-

mangiomata may be successfully treated by the application of a radium plaque. However, the application of radium to deep cavernous hemangiomata is of doubtful value as the strength of the radium emanations necessary to penetrate such a growth would probably have too great a destructive effect.

Case report. J. S., a white American male, aged fifty-one years, came to the Eye Clinic at the Lakeside Hospital (Service of Dr. A. B. Bruner) on May 6, 1932, complaining of a tumor of his right eye.

The tumor had been present since birth. It originated from the under surface of the upper lid and was about the size of a pin-head. When the patient was 20, the tumor had increased in size to that of a navy bean and protruded below the upper lid. In 1918 while he was employed as a carpenter a chip of wood struck the tumor causing considerable hemorrhage which was checked at the end of a half hour by the application of external pressure. Since this injury the tumor had doubled in size. The patient requested removal of the tumor because of its appearance.

The past history was unessential. The patient had always been in good health. He had had his first refraction in 1927. The prescription was O.U. + 1.12 D.sph. V.=5/5. With +2.00 D.sph. added he read Jaeger 1. Examination of right eye showed, arising from the fornix upper lid and extending down the nasal side of the ocular conjunctiva to the lower fornix, a lobulated, purplish-red spongy vascular tumor (frontispiece). It measured 2 cm. in length from above downward, 1/2 to 1 cm. in width and 3 to 5 mm. in thickness. Superiorly it was attached to the fornix. Medially it was attached in its entirety to the ocular conjunctiva. Laterally and superiorly it was attached to the ocular conjunctiva by several bands of adhesions. Laterally and inferiorly it was unattached. With the lids open, the upper and lower portions of the tumor were concealed and only the middle third was exposed. The tumor was non-erectile with change in position, did not pulsate, and was only slightly tender on pressure. The remainder of the ophthalmological examination was essentially negative.

On May 20, 1932, under local anesthesia, 1 percent cocaine instillation and ½ percent procaine infiltration, the tumor was excised. The subconjunctival tissue at the site of the tumor was cauterized with the actual cautery and the conjunctiva closed with interrupted plain silk sutures. The postoperative

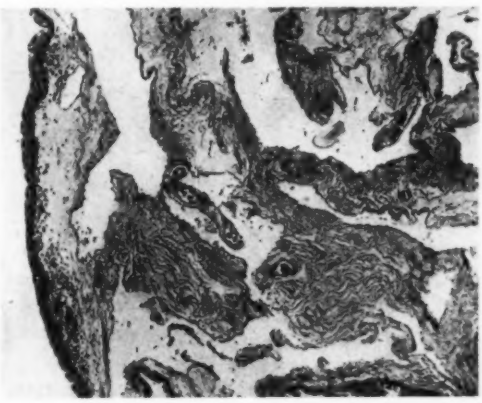

Fig. 1 (Motto and Dunnavan). Photomicrograph including the conjunctival epithelium and the dilated thin-walled subepithelial vascular spaces separated by an almost acellular, edematous fibrous stroma. Hemotoxylin-eosin stain. Wratten C filter (x 75).

course was uneventful. The sutures were removed on the fifth day and the patient was discharged on the sixth day with the wound healed and only a slight amount of conjunctival injection. Under a follow-up treatment of ¼ percent zinc sulphate salve and hot compresses the eye became quiet with a satisfactory result.

The pathological report was as follows: The specimen consists of a small portion of the conjunctiva with an underlying mass of spongy tissue containing many macroscopic, practically collapsed vascular spaces.

The microscopic examination disclosed a superficial epithelium of a stratified columnar type. The surface was quite smooth. The subepithelial tissue was very edematous and showed loosely disposed fibrous connective tissue in which there were scattered foci of lymphocytes. In this subepithelial zone there were many irregular angular

communicating labyrinthine blood-vascular spaces lined by a single layer of epithelium and containing red corpuscles. The walls of these channels were thin and they were separated by the edematous fibrous stroma (fig. 1).

Conclusion

Hemangiomata of the conjunctiva are rare. They are usually congenital and increase in size from traumatism. They usually occur on the globe and extend into the orbit. Hemangiomata are seldom malignant. Surgical removal is the treatment of choice and should be instituted in infancy to prevent the extension of the tumor, especially into the orbit.

M. P. Motto, 650 Rose building.
F. L. Dunnavan, Lakeside Hospital.

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THE CIRCULATION OF THE INTRAOCULAR FLUID

1. The Importance of the Optic Nerve

CONRAD BERENS, M.D.
AND
ADOLPH POSNER, M.D.
NEW YORK CITY

Experiments on rabbits confirmed the findings of previous investigators. The one experiment on a normal human eye indicated that fluid injected into the vitreous penetrated along the vessel sheaths of the optic nerve. This was contrary to any finding of previous observers. The literature of experimental work is reviewed. From the Department of Surgical Research, Cornell University Medical College. Read before the American Ophthalmological Society, June 27-29, 1932, New London, Connecticut.

Because of the importance of more accurate knowledge in regard to the posterior outflow of the intraocular fluid, especially in its relation to glaucoma and papilledema, experiments on animal eyes were undertaken. From these experiments and a study of the results of other investigators, we decided that normal human eyes must be used before definite conclusions could be drawn in regard to human eyes. The results of experiments on human and animal eyes will be described and evidence presented which possibly indicates a posterior circulation of the intraocular fluid in a normal living human eye.

This investigation developed in the course of an experimental study of the pathogenesis of papilledema[1]. A review of the literature revealed few experiments on living human eyes for the purpose of proving that the optic nerve is an outflow channel for the intraocular fluid, and these were negative. No record of evidence derived from experiments on human eyes has been found for the somewhat vague statements in textbooks of ophthalmology. Fuchs[2], for example, states that the optic nerve plays a rôle, though of secondary importance, in the drainage of intraocular fluid, and Duke-Elder[3] concludes that all parts of the eye are concerned in the absorption of the intraocular fluid.

One is impressed by the paucity of experiments conducted on living human material, while there is an abundance of work on living animal eyes and enucleated human eyes. Of the four experiments on living human eyes two were reported by Nuel and Benoit[4] in 1900, one by Weekers[5] in 1922, and one by Schneider[6] in 1924. Three of these eyes were apparently normal and were enucleated either for sarcoma of the orbit (Nuel and Benoit) or for epithelioma of the eyelid (Weekers). The fourth eye (Schneider) had a corneal scar with symblepharon and an atrophic anterior segment, but a well-preserved retina. In the four cases the same procedure was adopted, namely, one drop of india ink was injected into the vitreous one and one-half to eight hours before enucleation. In no case was ink found in the optic nerve or in the retina. In all but the last (atrophic anterior segment) the ink was found in the angle of the anterior chamber, within the iris and around the canal of Schlemm.

Animal experiments proved more successful in furnishing evidence of the existence of a posterior circulation of the intraocular fluid. Such evidence was first obtained in the rabbit by Ulrich[7] when in 1884 he noted intracellular granules of india ink in the perivascular spaces of the optic nerve twenty-four to forty-eight hours after injection. Ulrich's findings were confirmed in 1886 by Gifford[8] who in addition used cinnabar and bacteria as injection materials. As he found that the ink had entered the subpial space where the central vessels emerged from the nerve, he assumed that, at least in the rabbit, a communication exists between the aqueous chamber and the subarachnoid space of the central nervous system. Confirming Quincke's[9] work on the cerebrospinal fluid, Gifford concluded that the normal flow in the optic nerve sheath is from the brain toward the eye.

In 1900, Nuel and Benoit[4] stated that, although they could reproduce these results in rabbits, similar experiments with other species of animals were negative. Yet, so strong was the desire to explain certain pathologic alterations of the optic nerve-head that the negative human experiments were disregarded, and the results obtained from the rabbit experiments were generalized and promiscuously applied to human physiology. This tendency to compare rabbits' eyes and human eyes was augmented by the conclusions drawn by Paterson[10] from a similar series of experiments. He felt that the difference in the results obtained in the rabbit and other animals is only quantitative and is explained by the relatively enormous size of the perivascular space around the central vessels of the optic nerve in the rabbit as compared with other animals. Nuel and Benoit's experiments were recently confirmed by Weekers[11, 12] who found posterior drainage in the rabbit[11] but not in the pig[12].

Records of experiments on enucleated animal and human eyes are more numerous, but the results lack uniformity and therefore are not conclusive. The results vary according to the method employed, the postmortem changes in the eye and, in the case of human eyes, the degree of pathologic alteration.

At best, the conditions of these experiments were far from physiologic. To illustrate this, let us examine the type of experiments upon which Stilling[13] in 1886 based his conclusions that the optic nerve is the sole channel for the outflow of the intraocular fluid and that glaucoma is due to poor drainage combined with hypersecretion of aqueous humor. He took an enucleated eye, bisected it at the equator, removed the vitreous, soaked it in absolute alcohol for sixty seconds to remove the excess water, and tied the posterior segment to a tube through which he injected turpentine colored red with alkanin at a pressure equal to one-seventh the blood pressure, maintaining it for one-half hour. He observed that the fluid flowed out through the optic nerve at the rate of one drop in five minutes; from this he estimated the drainage through the optic nerve in twenty-four hours at three to four times the contents of the eyeball.

Other manometric experiments with excised animal eyes under more nearly physiologic conditions were reported by Priestley Smith[14] in 1888 and Niesnamoff[15] in 1896. Both arrived at closely parallel results, estimating the amount of fluid normally leaving the eye through the optic nerve at less than one fiftieth and one fifty-fifth, respectively, of the total fluid outflow.

The methods of research described represent a physiologic approach. Physiology, a younger science than morphology, usually follows in the wake of the latter, and one expects to find here, also, that morphologic researches preceded these but apparently proved inadequate. Such is actually the case. It had long been known that no true lymphatic vessels were present in the central nervous system and in the eye. Yet, it appeared self-evident that some channels must exist by means of which the tissue fluids are maintained in equilibrium with the blood plasma. As early as 1865 His[16] believed he had demonstrated the existence of such channels (he called them "perivascular lymphatic vessels") by the rather crude method of injecting into the central vessels of the optic nerve of the excised eyes of pigs and sheep, an aqueous solution of berlin blue, followed by alkanin red turpentine under great pressure until the vessel burst in places, allowing the previously injected blue mass to escape and spread outside the wall of the vessel, surrounding the red vessel like a hollow cylinder.

In 1872 Schwalbe[17] investigated the "lymph spaces" of the eyeball and optic nerve by tying the optic nerve and injecting dyes under pressure beneath the pia between the ligature and the eyeball. Depending on the amount of pressure used, the stain could be made to extend almost anywhere—into the perivascular spaces of the nerve and retina, between nerve bundles of the optic nerve, into the nerve fiber layer of the retina, between the vitreous and the internal limiting membrane, between the retina and the pigment epithelium, and

into the "central canal of the vitreous". Assuming that the intervaginal space of the nerve is a lymph space, he naturally considered all these injected spaces also as lymphatic channels.

Key and Retzius[18] conducted similar experiments using enucleated human eyes and in 1875 reported comparable findings in their neuro-anatomic work. These experiments are not convincing because of the pressure used for injection and the postmortem changes which rapidly break down delicate intercellular and cell membranes. In fact, Salzmann[19] dismisses these findings as mere artefacts.

The inadequacy of these morphologic studies caused the interest to shift to the physiologic methods which have been discussed. But the physiologic researches brought to light the crude state of our knowledge of the minute anatomy of the nervous system and the eye, and stimulated a renewed interest in morphology. Equipped with a better knowledge of structure, more definite conclusions may be drawn as to function.

Great advance was made by the work of Held[20] who in 1909 produced evidence of the existence in the cerebrum of a continuous glial membrane which separates the ectodermal nervous tissue from the mesodermal structures, namely, the pia and the blood vessels. Krückmann[21] applied Held's method to human eyes and made closely corresponding observations on the retina and optic nerve. He demonstrated that the perivascular spaces surrounding the capillaries of the retina, that is, the Virchow-Robin spaces, are really spaces in the adventitia of the vessel wall, bounded externally by a mesodermal membrane which in turn is separated from the nervous elements by another ectodermal glial membrane. Thus it appears that fluid interchange between blood and tissue probably occurs by osmosis whereas the normal glial membrane acts as a barrier to the passage of particulate matter.

Behr[22], in 1914, injected excised human optic nerves under moderate pressure and further strengthened the evidence presented by Krückmann by showing that the glial-ectodermal system of spaces within the substance of the optic nerve and retina is not in communication with the mesodermal-pial perivascular spaces; and although he actually demonstrated on living dogs[23] the presence of a fluid current directed from the eyeball centripetally within the glial spaces of the optic nerve, he insists that there is no connection between these spaces and the aqueous chambers, and that in the human eye there is no drainage of aqueous humor through the optic nerve.

A method which Weed had devised for studying the physiology of the cerebrospinal fluid was applied by Weed and Wegefarth[24] (in 1914) to the study of the perivascular spaces of the eye. This procedure, which we have adopted in our experimental work, consists in the injection into the vitreous, fifteen minutes before enucleation, and under very slight pressure, of a small quantity of an isotonic solution of potassium ferrocyanide and iron ammonium citrate, and immediate fixation of the eyeball in formalin containing one percent hydrochloric acid. The acid serves to precipitate the injected material as prussian blue. Weed and Wegefarth claimed they had demonstrated the existence of perivascular lymph spaces in the retina of albino rabbits. This experimental evidence was especially conclusive when the animal was killed by exsanguination prior to enucleating the eyeball, following the suggestion of Mott[25] who had shown that as the blood vessels empty, the perivascular spaces of the cerebrum tend to dilate and exert an aspirating action on the surrounding tissue fluids. Beautiful photomicrographs of these perivascular spaces were furnished in a recent paper by Evans[26] who, after a thorough study of the various experimental methods employed, concluded that Weed and Wegefarth's technic is the most satisfactory method for this purpose.

Our experimental methods

Although india ink and many other substances were used in our earlier animal experiments, our conclusions are based on the results obtained by the

method of Weed and Wegefarth. The formula used for injections was as follows:

Potassium ferrocyanide	0.5 gm.
Iron ammonium citrate	0.5 gm.
Water	50.0 gm.

This makes a clear solution which is isotonic with tissue fluids. The solution is injected slowly into the vitreous under very slight pressure, the amount of solution depending on the size of the eye. For human and dog's eyes, 0.1 c.c. was used, and for smaller animals a proportionate amount.

In the animal experiments, the animal was killed by exsanguination fifteen minutes after injection, the eye was enucleated, and immediately placed in a solution of 40 percent formaldehyde containing one percent hydrochloric acid.

In some experiments the procedure was modified in order to study the effect which a lowered intracranial pressure might have on the drainage of fluid through the optic nerve. One eye was injected as above described and was enucleated after fifteen minutes. The other eye was similarly injected, cisternal drainage was immediately begun, and the animal was killed by exsanguination after fifteen minutes. This experiment was performed on the dog, guinea pig and rabbit.

In another series of experiments performed on the dog and rabbit, an attempt was made to cause the cerebrospinal fluid to flow into the eyeball by lowering the intraocular pressure. The anterior chamber was punctured with a cataract knife. One and one-half cubic centimeters of Weed and Wegefarth's solution were injected into the cisterna magna and the animal was killed by exsanguination after fifteen minutes.

Mott's technic was naturally not applicable to human eyes, therefore the eye was merely enucleated after ten to twenty-four minutes and placed in the fixing solution. The eye remained in the formalin and hydrochloric acid for twenty-four hours*. Windows were cut in the sclera, and the eye was placed in running tap water, after which it was placed in 40 percent formaldehyde for twenty-four hours. Alcohol dehydration was then carried out in the usual manner.

As hardening of the tissue progressed, the hydrochloric acid precipitated prussian blue particles. Penetration of the tissue was rapid and uniform.

The advantages of this method, as pointed out by Weed and Wegefarth, and summarized by Evans, are:

1. The prussian blue particles are easily precipitated.
2. The blue particles are easily identified microscopically.
3. The precipitate is insoluble in the reagents used in making and staining the sections.
4. The reagents are not taken up by living cells.
5. The reagents used are not toxic when properly employed.
6. The reagents will not diffuse through adjacent tissues.
7. The reagents can be used in solutions isotonic with the tissue fluids.

We performed many experiments on rabbits, dogs and guinea-pigs, and all yielded such uniform results that the reliability of the method was considered proved.

Our experiments on animal eyes (india ink method)

Our early experiments on rabbits' eyes with india ink enabled us to demonstrate an accumulation of ink particles in the region surrounding the central vessels of the optic nerve, but, contrary to Nuel and Benoit's claim, it required several weeks for this migration to occur unless great pressure was used in injecting the ink. Most of the particles were enclosed in phagocytic cells. This finding demonstrated the existence of a potential perivascular space but it did not help to determine whether this perivascular space plays a part in the

* It was found that equally good results may be obtained if the treatment with dilute hydrochloric acid is delayed until after sections are cut, while the penetration is more uniform and can be controlled better by this method. Some of the later eyes (including the normal human eye of case 5) were prepared by this method.

circulation of nonparticulate, diffusible substances; neither did it indicate the normal direction of flow.

Our experiments on animal eyes (Weed and Wegefarth method)

The experiments conducted by the Weed and Wegefarth method may be divided into animal experiments and human experiments. The animal experiments do not merit detailed discussion, for they revealed nothing new, but served merely as a confirmation of the results obtained by Weed and Wegefarth. Of the animals employed—rabbit, dog and guinea pig—only the rabbit furnished evidence of drainage of the intraocular fluid through the optic

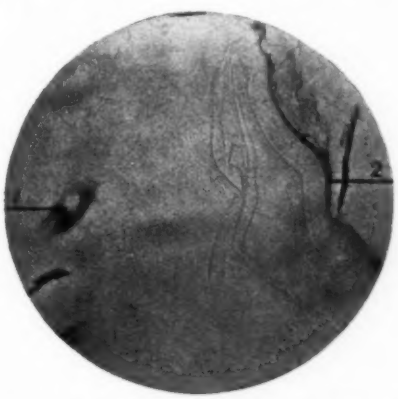

Fig. 1 (Berens and Posner). Rabbit. Sections through optic nerve. Weed and Wegefarth's solution injected into vitreous fifteen minutes before enucleation. 1. Central vessels surrounded by deposits of prussian blue stain. 2. Stain in the vitreous. (Weak eosin, x50, red filter).

nerve and the posterior portion of the retina: there was an accumulation of granules of prussian blue around the blood vessels of the optic nerve (fig. 1), and also surrounding certain ganglion and bipolar cells and their processes. In some of the eyes, the stain could be traced from the vitreous into the septal spaces between bundles of the optic nerve (fig. 2). When cisternal drainage was instituted prior to enucleation—the other eye being used as a control—no difference was noted between the two eyes which might be attributable to an aspirating action of the diminished intracranial pressure on the fluid contained in the aqueous chambers.

In the experiments on the dog and

Fig. 2 (Berens and Posner). Rabbit. Section through optic nerve. Weed and Wegefarth's solution injected into vitreous fifteen minutes before enucleation. 1. Branch of a central vessel outlined by the prussian blue stain. 2. Vitreous chamber. (Weak eosin, x100, red filter). 3. Prussian blue stain in septa of the nerve between nerve bundles.

the guinea pig, no stain was seen to pass into the retina deeper than the nerve fiber layer. No stain was found

Fig. 3 (Berens and Posner). Dog. Section through optic nerve. Weed and Wegefarth's solution injected into the cisterna magna after puncture of the anterior chamber. 1. Prussian blue in the sheaths of the nerve. 2. Prussian blue dipping into the septa. 3. Parenchyma of nerve showing absence of stain. (Weak eosin, x50, red filter).

around the central vessel of the optic nerve, even when cisternal drainage was used to lower intracranial pressure.

In the dog and rabbit, when Wege-

farth's solution was injected into the cisterna and the intraocular pressure was lowered by puncture of the anterior chamber, no stain was found in the retina or in the optic nerve deeper than the pial sheath (fig. 3).

Our experiments on human eyes

Five human eyes were injected with Weed and Wegefarth's solution about fifteen minutes prior to enucleation. Of these only one was a normal eye. The

Fig. 4 (Berens and Posner). Normal human eye (Case 5, M. R.). Section through optic nerve at the papilla. Injected by Weed and Wegefarth's method. 1. Pigment epithelium. 2. Granules of prussian blue stain in the vitreous. 3. Blood vessels outlined by the blue stain in perivascular location. A. Portion of field shown under higher magnification in figure 5. (Unstained, x110, red filter).

others, injected by Doctor Evans and studied through his courtesy, were seriously diseased. A report of these cases follows:

Case 1. Diagnosis: Degenerated eye. Wegefarth's solution (0.1 c.c.) was injected into the vitreous and the eye was enucleated after fifteen minutes. It was fixed immediately in acid formalin. No stain was seen in the retina or in the optic nerve.

Case 2. Diagnosis: Hypopyon ulcer. The eye had been irritable for ten days. Absolute glaucoma. Wegefarth's solution (0.1 c.c.) was injected into the vitreous and the eye enucleated after fifteen minutes. No stain was seen deeper than the surface of the retina.

Case 3. Diagnosis: Secondary glaucoma following removal of a cataract thirty years previously. Light projection faulty. Wegefarth's solution (0.1 c.c.) was injected and the eye was enucleated after ten minutes. Because of marked degeneration of the retina, no conclusion could be drawn. No stain was found in the optic nerve.

Case 4. Diagnosis: Beginning phthisis bulbi There was a history of a previous eye injury with resulting traumatic cataract and prolapse of the iris into the wound. The eye was totally blind.

Fig 5 (Berens and Posner). Normal human eye. Higher magnification of a portion of the field (A) shown in figure 4. Note discrete granules of prussian blue pigment surrounding two blood vessels. 1. Cut transversely. 2. Cut longitudinally. (Unstained, x530, red filter).

Wegefarth's solution (0.1 c.c.) was injected and the eye enucleated after fifteen minutes. The retina was degenerated so that no structure was visible. The prussian blue granules were found in the retina as deep as the pigment epithelium and where the retina seemed absent the choroid was stained in places. The optic nerve contained no stain.

The human experiment which is most useful in the elucidation of our problem is the following:

Case. 5. (M.R., aged twenty-seven years). Diagnosis: Sarcoma of the right antrum involving the right orbit. The eye was apparently normal. There was a history of recurrent tumor of the right antrum since 1929, in spite of operations and radiation therapy. Vision in the right eye was 20/70 and had been failing slightly for the past two months.

The patient complained of pain over the right eye. The right eyeball was displaced outward and upward by a solid mass extending into the orbit from the right antrum. The right iris was sluggish to direct light, but active to indirect light. The fundi of both eyes were normal.

Wegefarth's solution (0.3 c.c.) was injected into the vitreous under slight pressure. A tuberculin syringe and a twenty-six gauge needle were used and

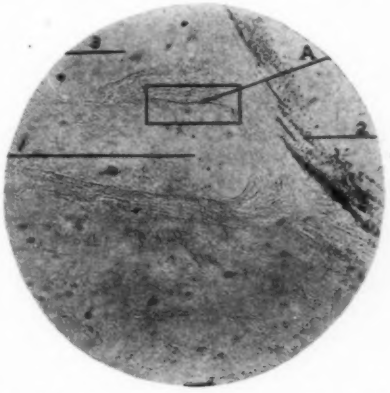

Fig. 6 (Berens and Posner). Normal human eye (Case 5, M. R.). Section through central portion of optic nerve, showing central vessels. 1 and 3, central vessels. 2. Prussian blue stain in the vitreous. A. Portion of the wall of central vessel containing blue stain and shown under higher magnification in figure 7. (Unstained, x110, red filter).

the fluid retained for one minute before the needle was withdrawn. The eye was enucleated twenty-four minutes later and immediately placed in five percent formalin after an injection of 0.2 c.c. of five percent formalin into the vitreous.

Microscopic findings: The retina was normal histologically. Granules of prussian blue stain were seen surrounding the capillaries and venules in the ganglion cell and bipolar layers of the retina. In the optic nerve, for a distance of 1.5 mm.* from the papilla the blue granules were arranged along the central vessels apparently just external to the endothelium (figs. 4, 5, 6, 7). They did not stain or penetrate into the lumen of the vessel or the adjacent tissues. The microscopic appearance of this eye, the only normal human eye in this series, corresponded closely with that of the rabbits' eyes.

A degenerated human eye with collections of blood pigment in the perivascular spaces of the retina, partly free and partly enclosed in phagocytic cells, shows a histologic picture similar, in so far as the perivascular spaces are con-

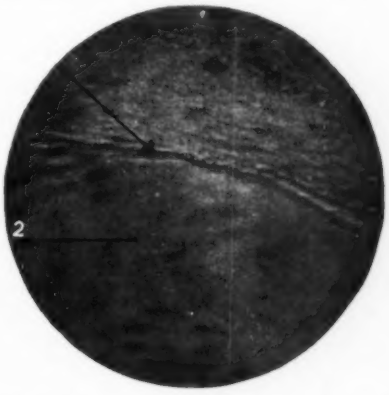

Fig. 7 (Berens and Posner). Normal human eye. Section through optic nerve. Portion of wall of a central vessel, 1 to 1.5 mm. from the papilla. 1. Granules of blue stain in perivascular location. 2. Lumen of blood vessel. (Unstained, x530, red filter).

cerned, to that of the eye which was experimentally injected with Wegefarth's solution (figs. 8, 9).

Discussion of the results of our experiments

We have unequivocally shown that in one normal human eye, just as in the rabbit's eye, fluids injected into the vitreous were found in the perivascular region of the central vessels of the optic nerve and in the posterior portion of the retina in a relatively short time, while this result was not obtained in several pathologic eyes. It is the interpretation of these results which requires discussion.

Weed and Wegefarth postulated the theory that the normal direction of flow of the intraocular fluid is from the retina into the posterior chamber and that the presence of prussian blue granules

*With the highpower lens discrete blue granules were seen in certain sections as far back as 2 mm. from the papilla, but could not be photographed because of technical difficulties.

in the perivascular spaces was attributable to the aspirating action of Mott's technic. Evans[26] has since shown that this factor is not essential, and our experiments have demonstrated that the same result can be obtained by simple enucleation.

Weed and Wegefarth were probably influenced in their deductions by the work of Weed on the cerebrospinal fluid and by the detailed analogy between the central nervous system and the eye

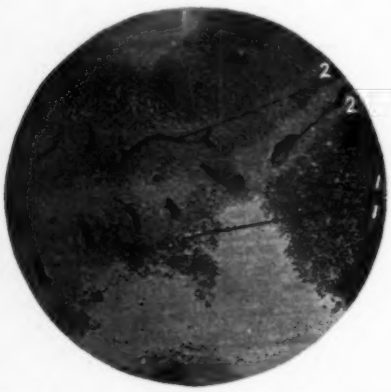

Fig. 8 (Berens and Posner). Degenerated eye (ruptured eyeball). 1. Blood in vitreous chamber. 2. Retinal blood vessels outlined by perivascular deposits of blood pigment. (Hematoxylin-eosin, x120). (Courtesy of Dr. John N. Evans).

drawn by Henderson[27] in his monograph on glaucoma. Thus, they compare the posterior chamber of the eye with the cerebral ventricles, regarding the internal limiting membrane of the retina as a modified ependyma. If this were indeed the case, we should not expect the content of the posterior chamber to leave the eyeball through the retina. But embryologically considered, the internal layer of the optic cup is really homologous with the outer layer of the cerebral cortex, and the internal limiting membrane of the retina with the pia mater (Mann[28]), so that the posterior chamber is a modified subarachnoid cisterna. From this analogy it may be concluded that the perivascular spaces in the retina and optic nerve can serve as drainage channels for the intraocular fluid under certain conditions, especially since it has been shown for the cerebrospinal fluid circulation that its direction is reversible, so that fluid injected into the subarachnoid space may be demonstrated in the perivascular spaces of the brain.

We therefore believe we are justified in interpreting our results to signify that potential posterior drainage channels exist normally, and that, although the normal direction of flow has not been determined, fluid may leave the eyeball by these channels, and does so

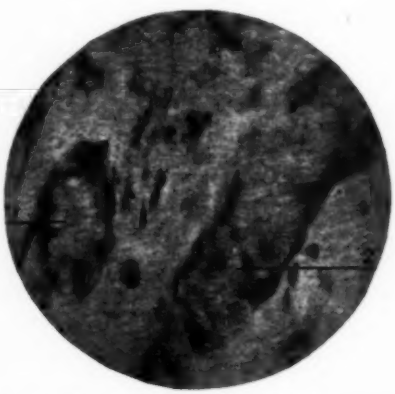

Fig. 9 (Berens and Posner). Degenerated eye. Same as figure 8. Higher magnification, showing two retinal blood vessels, (1) in transverse and (2) in longitudinal section, which are outlined by perivascular deposits of blood pigment. (Hematoxylin-eosin, x550). (Courtesy of Dr. John N. Evans).

when the intraocular pressure tends to rise or when for some other reason the balance is disturbed. A failure of this circulation, either through disease or maldevelopment, may be a factor in the production of certain cases of glaucoma.

Summary

1. A review of the literature indicates that the few experiments which have been made on living human eyes for the purpose of proving that the optic nerve is an outflow channel for the intraocular fluid, resulted in negative findings.

2. In our experiments the eyes of living animals and human beings were used exclusively. Weed and Wegefarth's prussian blue precipitation method was employed in most of our experiments. Injections were made into the vitreous, using small quantities of an

isotonic, nontoxic solution of potassium ferrocyanide and iron ammonium citrate. By fixing the eye immediately in acid formalin, the prussian blue is precipitated before postmortem changes have taken place in the tissues.

3. Of the animals used—rabbit, dog and guinea pig—only the rabbit furnished evidence of drainage of the intraocular fluid through the optic nerve and the posterior portion of the retina.

4. Of the five human eyes used for the experiments, one was normal and four were pathologic. No prussian blue granules were found in the optic nerves of the pathologic eyes. In the normal eye, however, the granules were seen to be arranged around the central vessels for a distance of 1.5 mm. from the papilla twenty-four minutes after the injection. (See footnote on p. 25.)

Conclusions

Our experimental evidence indicates that part of the material injected gained access to the perivascular regions of the central vessels of the optic nerve in the eye of the rabbit and in one normal human eye, and that no stain was found around the central vessels in four pathologic human eyes, the eyes of dogs or guinea pigs.

We are indebted to Dr. John N. Evans and Dr. J. E. Sweet for many helpful suggestions. Since our investigations concern related subjects, this paper may be regarded as one of a series, of which the article by Evans[26] was the first.

We also wish to express our appreciation of the assistance rendered by E. B. Burchell and Miss Adele Mayo in the preparation of many of the sections.

35 East Seventieth street.

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BILATERAL FACIAL SPASM

Paraspasme Facial Bilatéral of Sicard

HARRY L. PARKER, M.B.
ROCHESTER, MINNESOTA

The cause of this rare disease is not known. It usually occurs in middle or late life and is apparently associated with a degenerative cortical lesion. It is incurable and progressive. Two cases are reported. Read before the Chicago Neurological Society, Chicago, April 21, 1932. From the Section on Neurology, The Mayo Clinic.

There is a large number of disorders of motion affecting the facial muscles either alone or with the other muscles of the body. In this category may be included tic, spasm, myoclonia, athetosis, and chorea. There is one disorder, however, as yet not fully described in the United States which, because of its intensity, its incessant character, its disfiguring propensities and finally, the functional impairment of vision which accompanies it, bids fair to exceed in seriousness all other disturbances of muscular control of the face and interferes seriously with the well-being of the sufferer.

Meige, in 1910, in reviewing facial spasm, described several types. The more common type of facial spasm involves part or the whole of one side of the face, and may follow paralysis of the muscles of one side of the face. More rare types include facial spasm of one side, with paralysis of the other, and still more rare are cases in which the spasm lasts on one side for weeks or months, and disappears only to reappear later on the other side, and to persist indefinitely. Occasionally cases are seen in which spasm alternates from one side to the other; that is, spasm of one side follows that of the other in rapid succession. Finally, there is a type of spasm first described by Meige, and the subject of this paper, in which both sides of the face contract at the same time, and a hideous grimacing mask in perpetual motion is produced. Meige gave the name of "spasme facial median" to this clinical syndrome and reviewed twelve cases. In 1925, Sicard reviewed four cases of his own and suggested changing the name to "paraspasme facial bilatéral." Since then numerous examples have been described, chiefly in the French literature. The following report of cases illustrates the chief manifestations of the disease among patients of very different ages.

Report of cases

Case 1. A woman, aged seventy years, came to the Mayo Clinic September 24, 1918, because of inability to keep her eyes open and because of changes in speech and motion. Two years before registration she had complained of recurrent spasm of the eyelids, which although at first intermittent, had become continual, with varying intensity. She had gradually become unable to read, and more recently all housework and activity had become impossible because of blindness due to spasm of the eyelids. Several months after onset of spasm of the eyelids, spasm of other muscles of the face occurred. A year previously her relatives had noticed that her speech had become slow and more

deliberate. All movements were stiff and retarded, and tremor appeared in the right lower extremity. The only relief she could obtain for the spasm of the eyelids was by forcibly opening one eye with her fingers.

The patient was wrinkled, and displayed Parkinson's syndrome, which was more marked on the right than on the left side. Her speech was slow and monotonous, and there was an evident tremor in the right lower extremity. The gait was propulsive. Ocular movements were slow, but between the spasms she could look up or laterally; looking down immediately brought on a spasm. It was possible to pry open the lids with the fingers, and the resistance felt at first was marked but gave way gradually, then suddenly the lids opened easily and remained open for a few minutes until another spasm appeared and they shut promptly. During the height of the spasm of the eyelids the other muscles of the face, including those of the mouth, nose, and chin were involved (fig. 1). With relaxation of the muscles that closed the eyes, the other muscles also relaxed. Records are not available of her after-history, and the outcome is, therefore, unknown.

Comment. This patient had been seen several years before, and although the nature of the facial spasm excited considerable comment and the features of Parkinson's syndrome were well recorded, many other features were lacking in the observations recorded at the time. However, from the descriptions available and the photographic record, there is no doubt that this was a case of bilateral facial spasm or "paraspasme".

Case 2. A man, aged thirty-eight years, came to the clinic March 30, 1932, because of spasm of the facial muscles. He had been perfectly well, up to three years before registration. Suddenly, without any associated mental or physical cause, he noticed spasms of the eyelids while he was at home eating dinner. These spasms persisted, at first coming several times a day, but finally they occurred more or less continually. Periods of temporary improvement intervened, which were followed by periods of exaggeration of symptoms, but the general trend of the disease was progressively worse. A year after the appearance of the spasms of the eyelids there were associated movements of the face. At first the patient assumed that these movements were caused by his efforts to open his eyes, but during the following year they seemed to occur regardless of what he did. He complained that he had no rest from the movements except during sleep. During the day, when he was sitting quietly, or lying down, in complete physical and mental repose, the spasms were not so severe. The patient was a workman in an iron mill, and because of inability to keep his eyes open he had to cease work about six months after the onset of the disease; thereafter he was unable to work, and was unable to read or write because of the enforced blindness. Walking, although possible, was extremely difficult and he usually proceeded by fits and starts; he might have to remain standing, waiting for the spasm of the facial muscles to relax sufficiently to allow him to proceed. Crossing a busy thoroughfare was hazardous and he needed someone to lead him around.

Fig. 1. (case 1). Spasm of muscles of eyelids and other muscles of the face.

Speech was affected, and the movement of the facial muscles and the preoccupation with his constant effort to open his eyes disturbed the natural smoothness of conversation. He ate with difficulty because of the more or less continual blindness, and he spilled food frequently. Both he and his brother thought that his movement and gait were somewhat slower than previously, but ascribed these effects to difficulty in vision.

The patient was well developed and well nourished, weighing 118 pounds; he had lost about 22 pounds in the previous three years. His blood pressure in millimeters of mercury was 114 systolic and 90 diastolic. General and laboratory examination, including urinalysis, and the Wassermann test of the blood, gave negative results. He had some carious teeth and the tonsils were infected.

There was some suggestion of rigidity in his general movements, and the speed of motion of the fingers of the right hand was reduced. This reduction, however, was exceedingly slight. The spasm was a more or less continuous process, passing from clonic to tonic movements of the face, and interspersed with short periods of rest that never lasted for more than a minute or two. The cycle was irregular, and when the patient was under observation there was an incessant play of activity of the facial muscles. Usually starting from a short period of rest, there might be one or two clonic spasms of the orbicularis

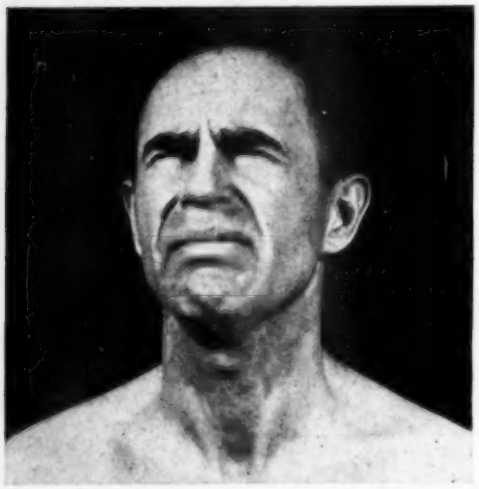

Fig. 2 (case 2). Expression similar to that of one who has partaken of something bitter.

oculi muscles, finally ending in tonic, forcible closure of the palpebral fissure. The frontalis muscles then took part, and all the muscles around the eyes seemed to coordinate in one tremendous contraction, clamping the lids shut. The movements of the upper part of the face were synergic, equal on two sides, and much swifter than those that followed. A few seconds after the eyelids closed, the rest of the face became involved, and the muscles of the nose, chin, and in more intense attacks, the platysma, caused an irregular grimacing spasm, without symmetry or order, and varied according to the intensity of the crisis. When the spasm was in full force the expression of the patient was similar to that observed when one swallows a pungent, bitter, nauseating dose (fig. 2). Some of the movements of the face seemed to be part of an ineffectual effort to open the eyes. The frontalis muscle might elevate in a few reluctant jerks, dragging up the eyelids and giving a glimpse of the eyes rolled up. The more these efforts were put into play, the worse the spasm became. The chin was usually held depressed on the thorax, but altogether, with the exception of the patient's frantic efforts to open his eyes, the spasm was confined to the muscles supplied by the seventh cranial nerve. His mouth was usually held open, displaying the teeth; by habit a toothpick was manipulated by his tongue. If attempt was made to talk during this time, and anything of an emotional nature was discussed, the grimacing and spasms of the eyelids became intensified. The man's speech was staccato; he used words with economy, and seemed too preoccupied with his facial activity to amplify or qualify anything that he might say. If the patient was left alone, and conversation dropped, the spasm might relax; first the lower part of the face from the platysma upward would cease to move, then, last of all, with a sudden jerk the eyes would open, the face would smooth out, and the expression become normal. Even under the most favorable conditions, and except when in complete repose, relief would never last more than a minute or two, and after the usual few preliminary spasms of the orbicularis, the eyelids would clamp down again and the whole process be repeated indefinitely.

Walking seemed to intensify the condition, and generally the patient felt his way with his hands, bumping into objects during the course of his walk. All animated conversation was impossible, but if the patient was instructed to lie down and enjoined not to talk, the greatest amount of relaxation was assured, and lasted from five to fifteen minutes. Because it was assumed that the movements of the mouth and other muscles of the lower part of the face were part of an attempt to open the shut lids, he was commanded to shut the eyes tightly, relinquish himself to the spasm, and make no further attempts to open his eyes. This, however, had little effect, and the movements of the face continued as before. The eyelids were dragged open forcibly by the fingers of the examining physician, but this was extremely difficult, did not influence the spasm, and the eyeballs were found to be turned upward as in sleep and not focused on any object near. The patient was asked to write and was able to do so, taking a very long time forming a few letters between the muscular spasms, and adding a word each time the eyes opened, writing rapidly while vision was with him, and then pausing until sight was again manifest. The result was that the letters were irregularly formed, disconnected, and the writing strayed off the line. There was also a certain amount of tremor.

When the patient was sitting quietly, not knowing he was under observation, his spasms continued, although to a less degree, and were less intense than when facing the examiner and attempting to describe his difficulties. He had some rather interesting mechanisms for the alleviation of the spasm. When trying to go to sleep at night, complete relaxation was difficult because of the spasm. He soon found that counting to himself in an undertone, slowly, up to twenty, would give him temporary relaxation. Ac-

cordingly, he did this over and over again, and finally succeeded in dropping to sleep. Invariably he had a toothpick in his mouth, and the function of this seemed to be that when balanced neatly on the tip of the tongue and prodded into the interstices of the teeth or the hard palate some relief from the spasm could be obtained. He seemed to be adept in this maneuver, and during the height of his facial contortions painfully and painstakingly juggled with this toothpick, feeling that this complicated maneuver gave him surcease. Because of experience with other patients it was suggested that whistling might affect the spasm, and although he could form no tune, he was able to produce an interminable series of short, low tones. During this maneuver all spasms ceased (fig. 3) and continued as long as he whistled, but he had little liking for the performance and returned promptly to juggling his toothpick. He was instructed to have the carious teeth removed and later the tonsils, and a course of stramonium leaves in powdered form was advised. Sufficient time has not as yet elapsed to estimate the efficacy of this treatment.

General comment

Although a static condition presents certain difficulties in adequate description, to produce a pen picture of a disorder of movement is one of the most difficult feats that an observer can attempt. Meige, however, adequately described the essential features of the cases he observed, and this description has never been improved. All his patients were of more than middle age, and had relatively stable personalities. They complained that at the onset of their condition they experienced intermittent momentary spasms of the eyelids, shutting out vision, possibly occurring a few times a day. Gradually the length of the spasm and frequency increased, and to the spasms of the eyelids were added spasms of all the other muscles of the face, including the platysma. Ultimately, the whole face was in almost incessant motion. The spasms usually go through an irregular cycle of clonic and tonic phases, with short periods of relaxation between. The eyelids, after a few preliminary, quick contractions, shut down forcibly and severely in a steady spasm lasting seconds to minutes. During this time the patient is necessarily blind, and must cease his or her occupation, the tonic spasm of the eyelids and orbicularis representing the more prominent feature of the disease; at the time that the eyes shut, the other facial muscles partake in the spasm but less continually or evenly. The movements of the muscles of the cheeks, mouth, chin, and platysma are irregular, asynergic, asymmetric and without order or rhythm, whereas the muscles around the eyes clamp down in a synergic, tenacious spasm. The patient's expression is one of being assailed by some pungent, stinging irritant, and at times the chin is depressed on the thorax, presumably by contraction of the platysma muscle. The mouth may be held open or shut. After a few seconds to a few minutes the spasms relax, the eyes open, the face becomes smoothed out again; then the whole performance recommences within a few seconds and is repeated incessantly throughout the patient's waking hours.

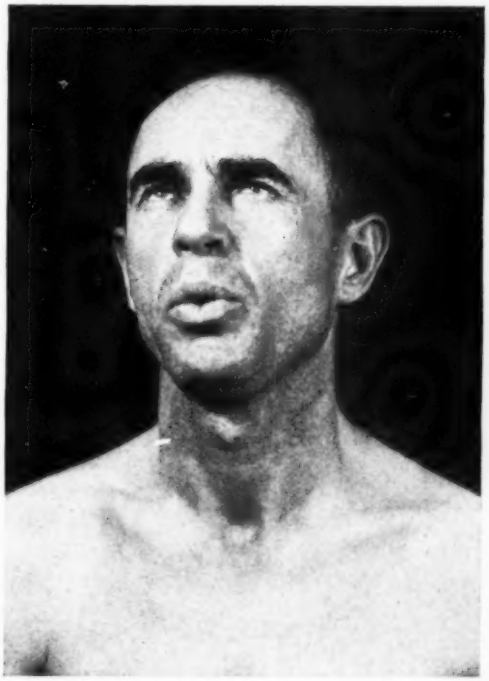

Fig. 3 (case 2). Spasm in abeyance while whistling. Eyeballs still turned upward.

The affliction disappears during sleep and during the first few hours of waking is not quite so severe, but as the day goes on it becomes intensified, preventing all activity because of the intermit-

tent, unexpected forcible blindness. Partial relief may be obtained by lying prone, with complete physical and psychic relaxation; the spasms are intensified by walking or talking, and speech becomes short, choppy, and is not indulged in unnecessarily. Most peculiar are the innumerable remedies adopted or discovered by the patient to relieve the spasm and permit at least

Fig. 4. Palpebral spasm accompanying parkinsonian syndrome consecutive to epidemic encephalitis.

some degree of activity. These include whistling, singing, coughing, pulling open the eyes with the fingers and, as in case two, counting out loud. The remedies, however, are only partially effectual and temporary, and usually all activity is reduced to the minimum and the patients prefer to spend their time indoors, sitting or lying quietly, completely surrendered to the incessant facial spasm with its concomitant blindness and social embarrassment.

The cause of this disease is unverified to date. Unquestionably, it is due primarily to some structural alteration of the nervous tissue, and when examining a patient with this affliction it does not appear that the origin is psychic or hysterical. The ages of patients affected vary greatly. The age of Meige's patients has been given. Sicard and Haguenau's patient was sixty-three years old, and one patient (case one) of mine was definitely senile, and moreover gave evidence of a well marked Parkinson's syndrome of senile type. Haguenau and Dreyfus, however, described two patients with this disease; one patient was aged sixty-one years but the other was only thirty-one. These authors were under the impression that in the first case the condition was due to cerebral arteriosclerosis, and in the second case to encephalitis, although all history of an initial infectious episode was lacking. The second patient described by me was aged thirty-eight years, and no previous history of encephalitis could be elicited. On the other hand, there were some highly suggestive signs of an early parkinsonian syndrome of the encephalitic type. Euzières and Viallefont described a similar case of a young man who, after an attack of encephalitis, became a victim of this characteristic bilateral facial spasm. It is possible, therefore, that there are two types of this spasm; one type described by the earlier writers, before the recent epidemic of encephalitis made itself manifest, which is apparently senile or arteriosclerotic in origin, and due to degenerative changes in the brain. The second type is inflammatory, and part of the complex and variegated picture of epidemic encephalitis. Each type, moreover, may or may not be accompanied by Parkinson's syndrome.

Since the outstanding feature of these cases of bilateral facial spasm or paraspasme is represented by spasmodic closure of the eyelids, with concomitant blindness, it might be asked, how do these cases differ from so-called blepharospasm of various origin? It must also be remembered that each case of major spasm of the face begins as blepharospasm. As a matter of fact, the difference is only of degree, and con-

sists in the relative intensity of spasm of the eyelid and orbicularis muscle, and the relative amount of facial muscle involved. Cantonnet gave an excellent classification of blepharospasm, and included types pertinent to the present consideration. After mentioning the various more or less common types of blepharospasm, he described not only blepharospasm following epidemic encephalitis but also blepharospasm in Parkinson's syndrome, consecutive to encephalitis. This latter type may be of such intensity, and last so long, that definite impairment of the patient's activity ensues. A severe case of this character was also described by Alpers and Patten, and almost every writer on the ocular manifestations of epidemic encephalitis has mentioned these palpebral spasms (fig. 4). Kennedy remarked that the forcible spasmodic shutting of the eyes in chronic encephalitis may last so long as to make it necessary for the patient to be led about as though blind. Similar comments were made by Vincent, Souques and Blamoutier, Hall and Bennett, and Patten. Apparently in these cases of parkinsonism following encephalitis, the blepharospasm may vary from gentle closure of the lids, as in sleep, to a severe tonic spasm, lasting for hours. It has been recognized for a long time that, apart from encephalitis, and excluding obvious cases of tic, the majority of cases of blepharospasm occur in older people. Vincent and Dereux described two cases of senile blepharospasm, and expressed the belief that the affliction has a physical rather than a psychic origin and has similar anatomic changes as in postencephalitic blepharospasm. In the series of cases of parkinsonism both of idiopathic and encephalitic origin studied by Young, forty-three of fifty cases had blepharospasm of varying degree, and more important, in nine of these forty-three cases, Parkinson's syndrome was of the idiopathic, presenile, or senile type. An analogy, therefore, holds between the types of bilateral facial spasm and the types of the more simple appearing blepharospasm. In the latter there are, among others, four types. The first and most common is the senile type, the second is the senile type with parkinsonism, the third the encephalitic type with parkinsonism, and the fourth the postencephalitic type without parkinsonism. Again, the various antagonistic tricks and subterfuges indulged in by patients with facial paraspasm, are often employed by patients with blepharospasm. One patient seen at the Mayo Clinic with Parkinson's syndrome of epidemic encephalitis found that brushing his closed lids with his thumb and forefinger released the spasm of the lids temporarily. He also obtained relief by jumping up and down. Another patient with senile blepharospasm found that humming or crying out released the tonic contraction of his eyelids. In two curious cases of severe blepharospasm the patients were seen by Woltman; there was no apparent cause for the condition, but it could be presumed to be due to encephalitis, although there was no frank history of infection, and parkinsonism was absent. The first patient obtained relief by singing, whistling, and particularly yodelling. The second patient was relieved by playing a harmonica; almost continuous blindness due to palpebral spasm was suffered before this solace was discovered. Taking everything into consideration, therefore, it would seem that certain types of severe blepharospasm represent merely a fragmentary part of the more serious syndrome of bilateral facial spasm or paraspasm. Senility or arteriosclerosis, with or without parkinsonism or epidemic encephalitis, are very frequent, if not indispensable pathologic backgrounds in the types of blepharospasm under consideration.

Regarding the actual anatomic-pathologic lesions in these diseases, little is known. Presumably they represent some type of release phenomenon secondary to injury of higher centers of control. As Kennedy suggested, they occur through the passing down of an ungoverned strain of tonic impulse from the basal ganglions, freed from their normal cortical government.

Records of necropsy of this type of case are not as yet available. Unfortu-

nately, it is possible that even a minute study of the nervous system after death may fail altogether to place so complicated a disorder of movement on a distinct anatomic basis. Generally speaking, the essential cerebral mechanism involved in this disease is as uncertain as that in the more common spasmodic torticollis.

The differential diagnosis of tic, myoclonia, athetosis, and chorea presents but little difficulty, since so far, all cases reported, including those reported here, have been strikingly uniform in their appearance, characteristic in their progress, and similar in their general behavior. They do not resemble any of the other types of facial dyskinesia, especially since the movements are relatively simple and involve one factor, namely, spasms closing the eyes and contorting the parts of the face and platysma muscle below and occurring over and over again during waking hours. Laignel-Lavastine reported a case which was similar to, but not quite the same, as the condition under consideration. The patient was a man, aged sixty-seven years. For sixteen months he had had spasms, at first in the mouth, accompanied by pharyngeal contracture. Later, the spasm reached the facial muscles, notably the palpebral and orbicularis oculi. Usually the spasm began by a series of pharyngeal constrictions, with a sensation as of a foreign body in the pharynx. The tongue then became pressed against the palate, the soft palate contracted, and the commissure of the lips widened. The mouth became half opened and the base of the tongue contracted by jerks. Then the eyelids contracted energetically but not completely, for downward gaze remained possible. The patient held his head inclined forward, and he looked as if he was masticating with difficulty or as if a large bolus of food had stuck in his pharynx. Removal of some nasal polyps temporarily relieved the condition.

To date, treatment for this condition is not very satisfactory. Meige thought his patients were relieved by reeducation of the facial muscles, and urged continual and determined efforts at obtaining facial control by practice before a mirror. Later writers, however, have not been so optimistic, and Sicard and Haguenau found all forms of psychotherapy useless. Injections of alcohol into the nerve, both peripherally and at the stylomastoid foramen, as well as surgical section of the nerve at these two points, unilaterally or bilaterally, seem equally unsatisfactory. Sicard remarked at the unusual rapidity of regeneration following section or injection of alcohol, and with regeneration the spasm returned. As a palliative measure, Sicard and Haguenau both recommended spectacles arranged so that clips hold the eyelids apart and permit the patient to see enough to carry on necessary duties. To date, at the clinic we have had no experience with this mechanical device. Theoretically, section of the facial nerve on one side and anastomosis with another nerve ought to produce good results when regeneration through the anastomosis occurs. It could be repeated later on the other side, using a different nerve for anastomotic juncture when it was shown that the first side operated on had regenerated well and the spasm had not recurred. This operative procedure, however, still remains only a hypothetic possibility. The coexistence of Parkinson's syndrome with the disease in question or the dread of its later appearance, makes these patients poor material for extensive surgical measures. Altogether, the treatment of bilateral facial spasm or paraspasm, as well as the more common blepharospasm of senile or encephalitic origin, leaves very much to be desired.

Summary and conclusions

1. The conditions of two patients suffering from bilateral facial spasm or paraspasm is described.

2. One patient was obviously senile, and had a well marked Parkinson's syndrome; the other patient was of middle age, and clinically the conditions suggested very early Parkinson's syndrome of the encephalitic type.

3. Two main causes for the disease apparently are senility or arteriosclero-

sis of the brain, and epidemic encephalitis.

4. The condition is extremely distressing, seems to persist indefinitely, and curative measures are as yet unknown.

The Mayo clinic.

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VACCINIA OF THE EYELIDS AND CONJUNCTIVA

M. L. Folk, M.D., F.A.C.S. and E. L. Taube, M.D.
CHICAGO

Vaccinia of the eyelids and conjunctiva as described in the literature and personally observed, is fully discussed. Experimental work on rabbits showed that mere contact with lymph vaccine or serum from pustule is sufficient to cause vaccinia blepharoconjunctivitis, but previous abrasion is necessary for vaccinia of the skin of the lids. From the Department of Ophthalmology, Michael Reese Hospital. Read before the Chicago Ophthalmological Society, May 23, 1932.

Accidental vaccination of the eyes is, undoubtedly, a very rare condition, judging from the few cases reported in the literature, as compared with the vast number of vaccinations performed daily throughout the world. A. J. Bedell, who made a thorough survey of the literature on this subject, was able to collect only ninety-three cases from the time of the introduction of vaccination by Jenner, in 1796, up to the year of 1920. Since then one case was reported by Ball and Toomey in 1922, two by Friede, and one by Motolese in 1930. One case reported by Fejer in 1913 was omitted in Bedell's bibliography. Adding our case brings the total of reported cases to date, up to ninety-nine.

Onset and course. As in primary vaccination, the incubation period is usually three days. The first symptom is redness and swelling of the eyelids, which may be accompanied by conjunctival injection and lacrimation. The swelling of the lids gradually increases until the eye is completely shut. In severe cases the cheek on the same side or even of the opposite side becomes red and swollen. The pre- and post-auricular glands usually become enlarged. On closer examination, one finds one of two or both types of lesions:

1. Ulceration of the lid margins involving one or both lids and frequently spreading to some extent over the palpebral conjunctiva. These lesions may be single or multiple, and are covered by a thick, tenacious, dirty-gray, adherent membrane. No scabs are found in this type as the ulcers are constantly bathed in tears preventing desiccation. The ulcerations usually heal within a week or ten days.

2. The second form is a typical vaccination pustule, umbilicated in the center and surrounded by an areola, situated on the skin of the eyelid, away from the margin, as in our case, or about the eyebrow, as in Bedell's case. This type goes through the various stages of the primary vaccination lesion, namely: papule, vesicle and pustule, and finally, on the fifth or seventh day, scab formation, the scab dropping off spontaneously within seven to ten days, leaving a pale white surface underneath.

Both forms may be found in the same individual, as in our case. The general constitutional symptoms vary; in the mild cases the temperature ranges from ninety-nine to one hundred degrees, and there may or may not be a slight leukocytosis. In the more severe cases, the temperature may go up to one hundred and two or one hundred and three degrees and there is usually a marked leukocytosis.

Mode of transmission and inoculation. Of all the cases reported in the literature, only twenty-five percent were due to homo-inoculation, the remainder occurring in vaccinators, mothers, nursemaids and others in contact with the vaccination vesicle. Bedell's case is very instructive and worthy of special mention. The mother who had been caring for the vaccinated child, always washed her hands after dressing the wound. On one occasion she failed to do so and accidentally rubbed her right eye. She developed a severe vaccinia of the eyelids four days later.

Very little mention is made in the literature as to the exact mode of inoculation—whether mere contact with the lids and conjunctiva is sufficient, or a previous abrasion is necessary. Fejer is the only one who mentions the presence of a scratch-wound on the lids prior to

inoculation. As an attempt to find an answer to this question, the writers carried out the following experiments on ten rabbits, or a total of twenty eyes. In eleven eyes, fresh small-pox lymph was instilled into the conjunctival sac. In three to five days, six eyes showed a mild ulcerative blepheritis, having the typical exudate on the lid margins. One showed a good sized ulceration of the lid margin, a marked injection of the conjunctiva of the upper lid and of the upper portion of the bulbar conjunctiva down to the limbus. The eyelids were pasted together and had to be pried open on several occasions. It was feared a corneal ulcer might develop. This, however, did not take place. Four eyes showed no reaction whatsoever. In eight eyes a glass rod dipped in the vaccine was gently rubbed over the lid margin and a portion of palpebral conjunctiva. Of these, four showed a moderately severe exudative membrane on the lid margins, one an extensive membrane, one a mild reaction and two gave negative results. None of these showed a vaccination pustule on the skin of the lids. In one rabbit, the skin of the lid was abraded close to the margin, and vaccine applied according to the standard vaccination technic. A typical vacine pustule appeared on the third day. Thus, sixty-three percent of the results were positive in the first instance and seventy-five percent in the second.

The above findings permit us to draw the following conclusions:

1. Vaccine blepheritis or blepharo-conjunctivitis may occur by mere contact of the lid margins with the vaccine-lymph or serum from the pustule, with or without friction. In the latter case, however, the reaction is usually more severe than in the former.

2. Vaccinia of the skin of the eyelids is almost always preceded by an abrasion, which may be so slight in some cases as to escape notice.

Histopathology. It is interesting to note that most of the pathologic studies of vaccinia in general were made on rabbits' corneae, where the early changes are best observed. Pohl-Pincus, Unna, and Howard and Perkins record the results of their studies as follows: beginning with hyperemia, there quickly follows a degeneration of the epithelial cells and swelling and vesiculation of the middle part of the prickle-cell layer, the center forming a cleft filled with blood corpuscles, broken-down cells and fibrin. This process later extends to the corium, where edema, leukocytic infiltration and vascular changes are observed. Thus, the early papule turns into a vesicle by liquefaction of its contents. The minute bodies found in the epithelial cells in vaccinia and variola were at first thought to be protozoa, and Guarnieri, in 1892, termed them cytorycytes, but we now know that they are degenerative cell products, which can pass through a filter, but are stopped by colloids.

Regarding the immunity relationship between the eye and the body, Gruter, after extensive studies on this subject, concludes that the same relations obtain in vaccination as with pathogenic bacteria; namely, that general body immunity confers immunity on the eye, especially the cornea, and vice versa. He found the immunity to be greater when the vaccination was performed in the vicinity of the eye or when done by the intravenous method; also, that the cornea and the anterior chamber obtain a greater degree of immunity than the vitreous.

Diagnosis. The diagnosis of the first type-blepharo-conjunctivitis is often difficult as it may readily be confused with diphtheritic or membranous conjunctivitis. The history of vaccination of the patient or his immediate relatives and associates together with the negative smear for Klebs-Loeffler bacilli, as well as the presence of Guarmieri bodies will clinch the diagnosis. The second type is much more readily diagnosed, inasmuch as the lesion presents a typical vaccination pustule; but even this may have to be differentiated from pemphigus, chancre or chancroid, or tubercular conjunctivitis. Again, the history is of prime importance, and, in addition, the serologic tests will aid in establishing the correct diagnosis.

Prognosis. The prognosis is surpris-

ingly good considering the degree of scarring produced by the primary vaccination of the skin. While severe complications such as corneal ulcers with perforation, lid deformities, symblepharon and ankyloblepharon have been reported, most of the cases have been mild and have healed within a short time, leaving no serious sequelae. According to statistics, the cornea is involved in only ten percent of the cases. The lack of tissue destruction produced by the secondary vesicle can be explained by the fact that it undergoes a quicker, more acute course, and heals much faster than the primary vesicle, so that the two often reach maturity at the same time. This rapidity of growth was first recognized by Bryce, who also found a direct ratio between it and the lapse of time between the primary and secondary vesicle; the longer the time the greater the rapidity of growth of the secondary vesicle, and vice versa. Hence, the tissue destruction will be less, the longer the lapse of time between the two inoculations.

Treatment. The condition is largely self-limited, and the usual treatment mentioned in textbooks, such as boric compresses, boric ointment, vaseline and silver preparations have very little effect on the duration of the disease. However, Friede claims to have been able by his treatment to shorten in two cases the duration of vaccinia to two or three days. He uses thirty percent argyrol packs between the lid margins three times a day for one hour, and the rest of the time packs of ravinol solution (1:100) changed every two hours, during the day.

Case report. Our patient, G. S., female, aged two years, was admitted to the children's department of the Michael Reese Hospital on February 11, 1932, with a markedly swollen left eye. The mother first noticed a nodule on the left lower lid five or six days prior to admission. This nodule had progressively grown larger and was associated with chemosis of the lids, so that on the morning of admission the eye was completely shut. On account of language difficulties, further information could not be obtained from the mother, but it was learned from a sister of the patient on the following day that two brothers and one sister of the patient had been vaccinated seven to eight days prior to the onset of the eye trouble. The patient herself had, however, not been vaccinated. General physical examination was essentially negative except for a three to four centimeter ulcerative area, covered with scabs, on the outer surface of the upper third of the left arm. The mother attributed this to a burn the child had sustained a few days previously. Examination of the eyes disclosed the left eyelids markedly swollen, red, tense and tender to touch. There was a one centimeter whitish umbilicated pustule on the outer third of the left lower lid. The upper lid margin showed a two by five millimeter ulceration in its outer half. The eyeball could not be inspected at this examination on account of the lid chemosis, and it was not deemed safe to use retractors.

The preauricular glands were enlarged. The temperature was ninety-nine degrees, pulse and respiration about normal. The leukocyte count was 11,600, urinalysis and Wassermann were negative. Wassermann of the mother was also negative, that of the father, four plus. The smears from the eyelids, nose, and throat were negative for diphtheria. Under the treatment of moist boric compresses, mercurochrome and bichloride ointment between the lids, the child made a complete recovery and left the hospital on the eighth day, with no scarring of the lids.

Summary and conclusions. 1. A typical case of vaccinia of the eyelids and conjunctiva is reported.

2. A survey of the literature brings the total number of reported cases to date to ninety-nine.

3. Experimental work bearing on the exact methods of inoculation shows that mere contact with the eyelids is sufficient to bring about vaccinia blepharitis, but that for vaccinia of the skin of the lids previous abrasion is necessary.

4. Pathology, immunology, diagnosis, prognosis, and treatment are discussed.

5. It is suggested that the possibility of eye inoculation with vaccinia be more forcibly brought to the attention of physicians, nurses, public health agencies and lay people in order that proper precautions be instituted in the handling of the vaccination wound or the vaccine lymph.

55 East Washington street.

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For review of the literature up to the year of 1920, the reader is referred to Bedell's article.

ENDARTERITIS OBLITERANS WITH SPONTANEOUS GANGRENE OF BOTH CORNEAE

ADOLPH O. PFINGST
AND
C. DWIGHT TOWNES
LOUISVILLE, KENTUCKY

Blood vessel disease is discussed and a case in which the principal vascular lesion was an intimal change and in which both corneae were lost from this disease is described. Read before the American Ophthalmological Society at New London, Connecticut, June 27, 1932.

A survey of recent literature reveals an increasing interest in morbid conditions of the circulatory system, especially of the peripheral blood vessels. Case reports of diseased blood vessels appear with much greater frequency than formerly, perhaps not altogether on account of an increase in the frequency of blood vessel disease but probably because we are on the lookout for such cases since the relation of anomalies of the blood vessels to essential hyperpiesis has been so widely studied. A careful review of the various reports regarding blood vessel disease would indicate that considerable confusion exists regarding the nomenclature, the etiology, and the pathogenesis of these cases. Arteriosclerosis and atheroma of the vessel walls have long been considered histological entities. However, many conditions which were formerly placed under the category of arteriosclerosis are now considered as separate and distinct diseases and this will, no doubt, eventually bring about a change in the classification of localized vascular diseases.

The present interpretation of arteriosclerosis is that it is largely a disease of advanced life and that it occurs chiefly in the arteries of the elastic type, which means in the aorta and in the large arteries supplying the viscera. The pathological changes occur chiefly in the tunica intima and consist of an elastic hyperplastic thickening. The pathology takes place in circumscribed raised areas or so-called plaques. These mural cushions frequently calcify or undergo fatty degeneration or atheromatous disintegration. Arteriosclerosis is not limited to the aged. However, when it occurs in the young, infrequently, it usually involves the small arteries and does so in a diffuse or uniform way rather than in the production of circumscribed mural platelets as in the large vessels. The hyaline changes are usually limited to the tunica intima where connective tissue develops between the elastic fibers along with a

new formation of elastic tissue. In later stages the tunica media may become involved in the sclerotic process.

Although earlier reports of a few scattered cases of proliferative disease of the intima of peripheric vessels, which terminated in occlusion of the lumen, appeared in literature (by Jaesche in 1865, Burroughs in 1867 and others) the first detailed study of such vascular lesions was published by Carl Friedlander in 1876[1]. Friedlander described an affection of the vascular system characterized by the development of a richly cellular connective tissue within the intima of the small and medium-sized arteries which he termed "arteritis obliterans" and which he considered a morbid entity. He noted that such arterial changes were not infrequent in the lungs in the presence of tubercular disease and within neoplasms, especially in scirrhous cancers and that the proliferation often lead to narrowing or to complete occlusion of the vessels. He made no mention of gangrene occurring during the course of the disease, hence we must assume that he did not associate the disease with juvenile gangrene. He expressed the belief that the blood vessel changes were secondary to some morbid constitutional process. He also pointed out the similarity in the structural changes occurring in this affection, to those in the physiological obliteration of Botalli's duct and in the umbilical vessels. Since Friedlander's pioneer work many cases of peripheral vascular disease have been recorded and their pathogenesis variously interpreted. At present it would appear that the cases reported under the various captions as arteritis obliterans, endarteritis obliterans, productive arteritis, polyarteritis nodosa, thromboangiitis obliterans, Buerger's disease and Raynaud's disease have many histopathological and some clinical features in common and that they also show structural similarity to arteriosclerosis as it occurs in young individuals. A careful study of the published cases based upon the clinical course and microscopic findings would lead one to conclude that even though the blood vessels are similarly affected in that their lumen is encroached upon, they cannot all be placed in the same category. Many of the German pathologists[2] lean to the belief that the cases characterized by a proliferative process of the tunica intima which show no evidence of an inflammatory reaction of the middle and outer coats, represent a primary disease which bears no relation to arteriosclerosis or to organized clot formation and class them as an essential endarteritis obliterans.

It is presumed that in these cases a period of metabolic disturbance of an indefinite duration precedes a multiplication and stratification of the cells of the intima and that the resistance offered by the other walls of the vessels determines the proliferation centrally and an encroachment on the vessel lumen rather than an invasion of the outer and middle coats of the vessel. The hyperplasia usually occurs uniformly and consequently narrows the vessel concentrically although it may take place more abundantly on one side of the vessel than the other, thus creating an eccentric lumen. In either case the consequence is a high grade narrowing of the caliber of the artery with a lessened distal blood supply or a final complete occlusion. The arterioles and small arteries are most frequently involved although the process progresses in a proximal direction and may thus involve arteries of a somewhat larger caliber. Contrary to arteriosclerosis and atheroma, endarteritis proliferans has never been observed in large or middle-sized arteries. It has also never been observed in the venous system. It is conclusive from cases in which every portion of the body was subjected to microscopic study, including our case, that any structure in any region of the body may participate in the disease, though it has been observed with greatest frequency in the vessels of the lower extremities. It would be a difficult matter to determine just what constitutes a normal middle coat of an artery as regards thickness. Hence, it is possible that even in those cases in which a thickening of the musculo-elastic layer is not apparent, some slight hy-

perplasia may have occurred in the cases recorded as essential endarteritis. In our case an undoubted hyperplastic thickening of the middle coat of some of the vessels had occurred.

It is evident in reviewing the literature of blood vessel disease that in many cases a primary hyperplasia of the muscular and elastic tissue of the tunica media and a cellular infiltration of the tunica adventitia takes place and that the intima become secondarily involved, finally terminating in the formation of an occluding thrombus and secondary gangrene of the parts supplied by the occluded vessel. It was to this class of cases that the term "endarteritis obliterans" was first applied in 1879 by von Winniwater[3]. Von Winniwater did not determine whether the changes in the middle and outer coats were of a primary nature or whether they were superimposed on the endarteritis. Brown, Allen, and Mahoner[4] promulgated the theory that the cases described as essential proliferative endarteritis in which the intima alone was involved merely represented a prethrombotic stage. This view is evidently gaining ground for in a recent exhaustive article by A. P. Carvadias[5] on endarteritis obliterans he distinguishes three periods in the evolution of the disease: (a) prearteritis stage in which metabolic changes occur, (b) a period in which endarteritic lesions occur evidenced in proliferation of the cells of the intima, and (c) a thromboarteritis representing its terminal phase characterized by a cellular infiltration of the middle and outer coats of the vessel and the formation of an obstructing organized clot. Contrary to this view is the one expressed by Buerger[6], who in 1908 dissected a number of thrombosed vessels in the extremities which had been amputated for spontaneous gangrene, that the pathology of these cases is primarily the result of an acute inflammation of the outer and middle walls of the artery, that the involvement of the intima is secondary to the peri- and mesoarteritis and of minor importance in the ultimate formation of a thrombosis and gangrene. The clot, made up of erythrocytes, leucocytes and fibrin, finally becomes organized and vascularized and leaves no endothelial lined lumen. Buerger, who has made an intensive study of this class of blood vessel disease, considered it a clinical and pathological entity and adopted for it the term "thrombo-angiitis obliterans" though the disease is now known by many, especially in our country, as Buerger's disease. Brown, Allen, and Mahoner[4] have recently made an important contribution to this subject representing a study of twenty-five cases. They place the early changes in the adventitia, an infiltration of lymphocytes followed by proliferation of connective tissue with marked vascularization, and hold the view that this is followed by like change of the middle coat with increase in interstitial connective tissue but that no changes occur in the muscular structure. They

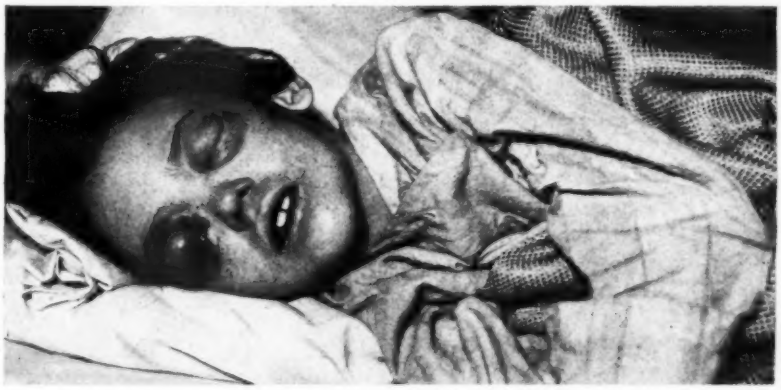

Fig. 1 (Pfingst). Hematoma of right eye.

considered the intimal thickening through cellular proliferation as the final changes in the process. These authors described the changes as occurring mostly in the larger vessels of the extremities. It was often confined to one or two toes of the lower extremities, although the fingers are not infrequently the site of the disease. In fact, it may occur in any region of the body. It seldom occurs as a symmetrical bilateral condition as in Raynaud's disease. Brown, Allen, and Mahoner classify an early period of intermittent claudication which is manifested in abnormal fatigue and pain of the extremities after exercise of the parts followed by postural color changes, that is, a rubor with dependency and a pallor with elevation of the member. This may continue for from one to ten years before the ultimate stage of trophic disturbance, ischemia or gangrene develops.

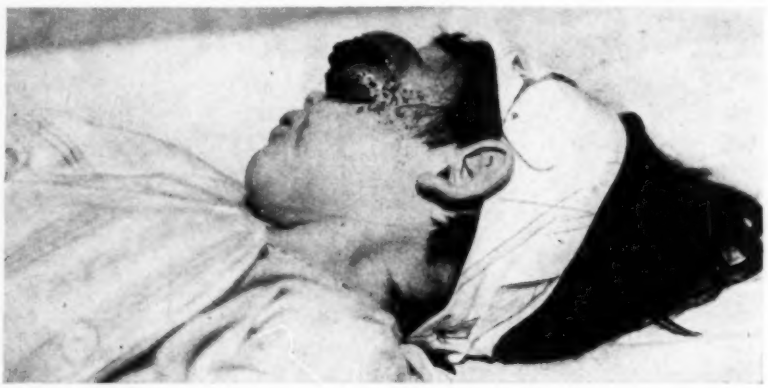

Fig. 2 (Pfingst). Large hematoma of left eye.

Raynaud in 1862[7] reported a series of cases which have been described as a functional form of vascular disease in which the end result of the blood vessel contracture was gangrene but in which there was no demonstrable occlusion of the arteries supplying the gangrenous area. This is known as Raynaud's disease. It is now considered as an independent disease in which the obstruction of flow of blood is due to an angiospasm of vasomotor origin, for these cases are seldom associated with histologic changes in the walls of the blood vessel. Such cases are the so-called "pure" cases but it has been demonstrated that in the advanced cases of Raynaud's disease associated with necrosis, thrombosis of the vessels sometimes occurs, thus showing structural similarity to the other forms of blood vessel disease[8]. Clinically, Raynaud's disease is characterized by periodic attacks of regional ischemia associated with violent pain in fingers or toes occurring nearly always symmetrically on the two sides. After repeated attacks of ischemia of short duration over the period of several years, regional cyanosis and later gangrene of one or several fingers or toes, rarely the cheeks, nose and ears, may prevail. Arterial pulsation in the affected parts is restored in the intervals between attacks, which is contrary to conditions in thrombo-angiitis. Raynaud's disease prevails in women with much greater frequency than in men. It also occurs more frequently in the upper than in the lower extremity.

Disregarding Raynaud's disease which runs such a decided clinical course all its own, we might follow the suggestion of H. Kahler[9] and others and apply the terms thrombo-angiitis obliterans and endarteritis synonymously inasmuch as cases of all degrees of involvement have been recorded and a sharp line of clinical and anatomical distinction cannot be made between them. In fact, this is also true clinically of peripheric arteriosclerosis.

Statistics would indicate that vascular disease with organic changes in the

small vessels is a disease of young adult life occurring mostly between the ages of twenty-five and forty-five years. However, quite a few cases have been reported occurring in younger children. Brown, Allen and Mahoner cite two cases reported by others, one occurring in a boy of three and one in a child of nine. Our case occurred in a girl of nine and J. McMichael[10] reported a case occurring in a child only eighteen months old. Cases of peripheric arteriosclerosis have also been observed in very young children.

The strange and interesting fact has been established that the cases reported as thrombo-angiitis obliterans occur almost exclusively in males, though a few have been observed in the other sex—according to Buerger in the proportion of 500 to three. On the other hand, arteriosclerosis plays no favorites of sex. The preponderance of thrombo-angiitis obliterans in males has not been satisfactorily explained although it has been suggested that as females are less exposed to trauma and that up to within recent years they have not been exposed to poison of tobacco and inasmuch as traumatism and exposure to tobacco are enumerated among the possible causes of the disease, its infrequency in the female can thus be explained.

An interesting genealogical feature of thrombo-endarteritis which has not been satisfactorily explained is its peculiar predilection for the Hebrew race, especially in Russia where Jews furnish fifty percent of the total of cases. The cases which were reported as essential endarteritis obliterans occurred equally in either sex, they occurred in individuals not exposed to tobacco or trauma and they did not show a predilection for the Hebrew race.

The etiology of obstructive vascular disease is largely speculative, hence the list of probable causes is a long one. Those observers who lean to the opinion that the intima is frequently the primary seat of the disease, believe that it is essentially a disease of disturbed metabolism but that exogenous influences circulating in the blood must be looked upon as localizing factors in the proliferative process.

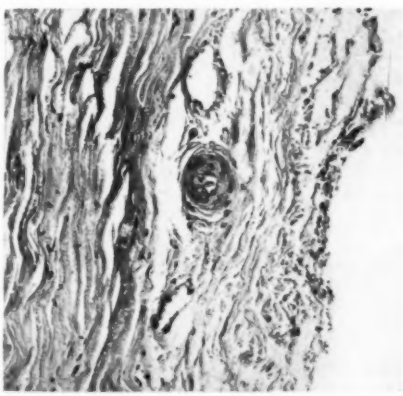

Fig. 3 (Pfingst). Outer coat of the sclera. The intima is markedly thickened and encroaching on the lumen. Note the absence of changes in the corresponding vein.

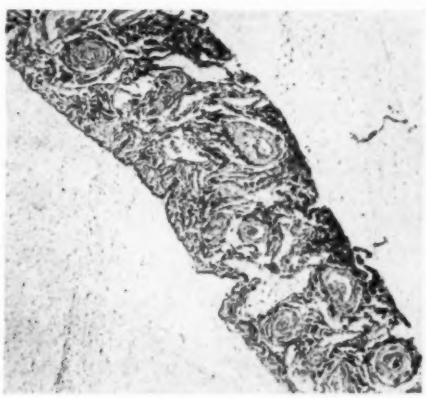

Fig. 4 (Pfingst). Detached choroid. There are many damaged vessels, some of which are completely closed by proliferation of the intima.

Theoretically, the presumable early metabolic changes have been attributed to disturbed endocrine activity. An unstable nervous system has been assigned by some as a contributory cause, a theory based on the relative frequency of the disease among Jews. The preponderance of occurrence of the disease in excessive smokers has placed nicotine poison at the top of the hypothetical, exogenous influences. Focal infections may, with some probability, be classed with the exciting causes of the blood vessel disease. The theory that repeated anaphylactic shock with

resulting altered blood stream may cause injury to the blood vessels has also been advanced.

Although lues has, by many, been held responsible for the disease involving the vessels, bacteriological and serological study failed to demonstrate syphilis in the majority of cases. When it is a factor it does not affect the middle arterial layer in the formation of gummata, but merely lowers the vitality or power of resistance of the body. The same may be said of the diabetes which has been given a place among the causative elements of end-

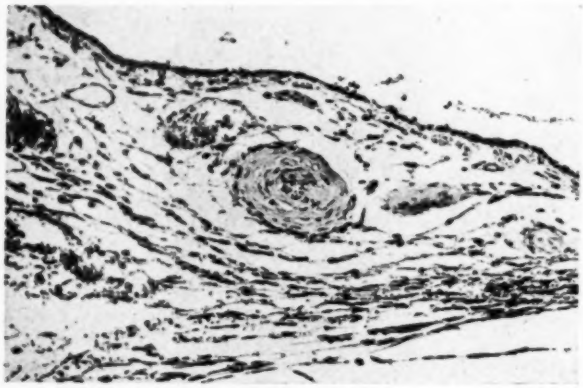

Fig. 5 (Pfingst). Choroid. The small artery shown is badly damaged by proliferation of the intima. The accompanying view is without damage.

arteritis obliterans, also of infectious diseases such as typhoid, influenza, measles, and others. Lowered resistance of the blood vessels brought about by exposure to cold has also been considered as an etiological factor of the disease, based on the observation of its frequent occurrence among sailors, among soldiers in winter and its greater prevalence in cold countries.

Case report: A most unusual case of gangrene of the corneae of both eyes has recently come under our observation in which we failed to make a preoperative and postoperative diagnosis and in which autopsy revealed an extensive generalized visceral endarteritis involving the small and medium sized blood vessels which culminated in destruction of the corneae.

On December 26, 1930, Doris R., female, aged nine years, white, gentile, was seen in consultation with Dr. Charles Beck of Louisville, on account of pronounced protrusion and swelling of the lids of the left eye. The history was elicited that the present trouble began on December 20, 1930, with what appeared to be a large subconjunctival hemorrhage of the left eye. This rapidly increased in size developing into a hematoma which in twenty-four to thirty-six hours had become large enough to cover the entire cornea and to protrude between the eyelids which had become lifted high above their normal level.

The previous history indicated that prior to 1928 the patient had had an occasional attack of tonsillitis and co-incidental earache and that during one attack the left ear had become abscessed and discharged pus for several weeks. The child had always been underweight. In December, 1928, she began to complain of frontal headaches with occasional nausea. This was relieved by the use of glasses prescribed by Dr. Beck in March, 1929 (2.0 D. cylinders with oblique axes). However, there was a return of headache and nausea and occasional vomiting eight months later. In February of 1930 she suffered a partial paralysis of the right facial nerve which cleared up entirely in a few days following removal of hypertrophied tonsils. The other symptoms continued and the child complained of defective vision. Examination by Dr. Beck disclosed extensive chorioretinitis, each eye showing sev-

eral large areas of choroidal atrophy with pigmented edges. Through the courtesy of Dr. Beck we examined the child at that time and corroborated his ophthalmoscopic findings. The best obtainable vision with correcting lenses was 20/100 in each eye. Visual fields were not taken. Notwithstanding a negative blood Wassermann reaction the child was given four doses of neoarsphenamine within a month and then placed on potassium iodide by mouth. The headaches continued but took on an intermittent character, coming on coincidentally with nausea at intervals of two to three weeks. The child became listless and before the ocular hemorrhage in December there had developed general malaise and considerable headache and nausea.

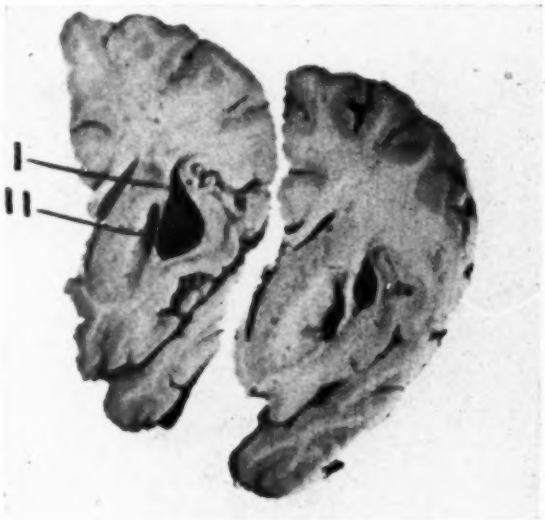

Fig. 6 (Pfingst). Showing the sectioned surfaces of the right hemisphere through the island of Reil: I, Cyst involving the external capsule. II, Portion of the cyst encroaching on the lenticulate nucleus. The other section is posterior to the one marked. (Reduced one-third.)

There was a good family history, father and mother having never been sick. There was a negative history for tuberculosis, lues, and malignancy. There was no consanguineous marriage, no history of hemophilia.

Condition upon examination: A small, poorly nourished girl with no pathology determinable except in the eyes. The eyelids of the left side were discolored, swollen and chemotic and were stretched tensely across a large hematoma, a portion of which was protruding between the lids covering the eyeball. A sero-sanguineous fluid was oozing from under the clot. The cornea could not be exposed. The right eye appeared normal though the choroid was marked by several atrophic areas. The optic nerve was, perhaps, somewhat pale. The arteries and veins were of normal size and appearance. X-ray examination of the orbits, skull and accessory nasal sinuses revealed nothing of significance. The child was in bed in a semi-comatose condition from which she could be aroused, enabling her to answer questions intelligently. Her chief complaint was pain in the head with a tendency to nausea. Movements of her head and neck caused considerable pain in the neck and shoulders. Temperature ranged from 98.6° to 100.5°. Pulse was 115.

A complete physical examination revealed nothing to lead to a diagnosis. Blood pressure was 105/75, blood count: red cell 4,550,000; white 8500 (55 percent polymorphonuclears); hemoglobin 73 percent; blood clotting time six minutes; urine contained a trace of sero-albumen, a few red blood

cells, no casts; serological examination of the blood again resulted in a negative Wassermann reaction.

Although the case at first glance was suggestive of thrombosis of the cavernous sinus, the symptoms were not definite enough to warrant a diagnosis. After keeping the patient under observation for two weeks with no apparent change in symptoms, an exploratory operation was decided on. Under general anesthesia the large clot was removed from beneath the swollen lids. Upon reaching the normal position of the eye ball it was found that the cornea was entirely absent, exposing the scleral cup which was filled with clotted blood and fragments of the other coats of the eye. A portion of the chemotic conjunctiva and the large orbital clot was submitted for biopsy. Fragments of normal corneal structure were found in the clotted mass. The conjunctival tissue was markedly thickened. The microscope revealed a separation of the fibrous stroma, probably the result of edema; several areas of clotted blood, but little or no cell infiltration. Spinal fluid obtained during the operation also gave a negative Wassermann reaction. A postoperative diagnosis could not be made. The child recovered from the operation without incident. Fifty mg. of radium was applied to the left orbit and left in place for twenty-eight hours. There was no further hemorrhage and the edema subsided within a few days.

On February 4, hemorrhages in portions of the gums were noted, also fresh blood in the stools and in the urine. In the meanwhile, the patient complained increasingly of headache. There was a loss of appetite, occasional emesis, general apathy except when complaining of pain. Temperature ranged from 101°–102½°. There had never been any signs of disturbed circulation in the extremities.

On February 7, the right eye rapidly developed a large subconjunctival hematoma identical to the one in the left eye though somewhat smaller. No local treatment was instituted as the patient was suffering severely with headache and frequent vomiting and was apparently rapidly nearing the end which followed on March 12.

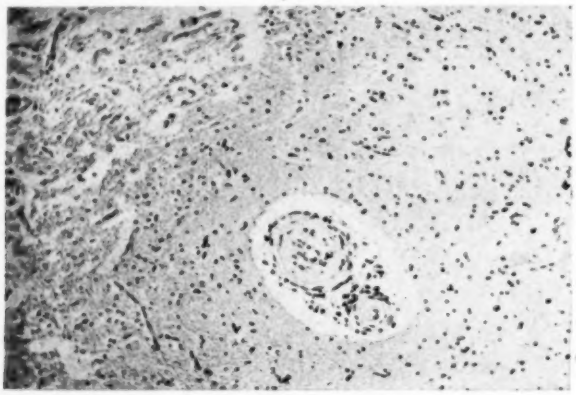

Fig. 7 (Pfingst). Brain from cyst wall. Two small arteries with very small lumina are shown. The resulting ischemia caused liquefaction necrosis or cysts, the wall of which is shown.

A complete autopsy including all of the viscera, brain, blood vessels, muscular structure, marrow of bones, and other structures was made two hours after exitus by Dr. A. J. Miller, Professor of Pathology, Medical Department, University of Louisville, and in submitting an abstract of this elaborate necropsy report such items which seemed irrelative to the ocular pathology have, for the sake of brevity, been omitted.

"Gross findings: General emaciation. A small atheroma of the intima was noted in the first portion of the arch of the aorta and two small plaques of atheroma were also seen on the medial

flap of the mitral valve. The gastro-intestinal tract showed no gross changes. The liver showed some light-colored portions in which the tissue had a gelatinous appearance. The left kidney weighed fifty grams. Its upper pole was slightly shriveled; capsule adherent. The cortex on the posterior aspect was much scarred, indicating the presence of an old infarct. The right kidney was very small (five grams). The renal artery was patent, but of small size. The cortex and medulla were well differentiated, suggesting that the small kidney was the result of arrested development.

"Head: Cerebro-spinal fluid abundant and cloudy, the cortical surface moderately ironed out, suggesting increased intracranial pressure. The left tympanic cavity was filled with greenish yellow thick pus. The left eyeball was shriveled and seemed to be devoid of its anterior portion. The right eyeball was imbedded in a large blood clot. The entire cornea, lens, and ciliary body were absent, the scleral cup filled with clot.

"Bacteriological note: Cultures from spinal fluid revealed many pneumococci, a few staphylococci, some tetrads and Bac. coli.

"Serial sections of the brain after hardening revealed in the right hemisphere between the claustrum and the insula, a cyst measuring 1 x 2½ x 3 cm. The wall was hemorrhagic, the contents yellowish, indicating its formation by liquefaction of an infarcted area.

"Summary: Meningitis of mixed infection, probably secondary to otitis media, acute degeneration of liver; infarcts in left kidney and brain; slight atheroma of aorta and mitral valves and destruction of the anterior portion of both oculi.

"Microscopic findings: Heart; muscle fibres hypertrophied. Many of the coronary vessels including the arterioles (vessels varying from 100 to 500 micra in diameter) and even some larger branches of the coronary artery were found sclerosed. The sclerosis consisted of connective tissue thickening of the intima. In this new tissue there was some degeneration, in fact, the sclerosis resembled that found in elderly individuals with cardio-renal disease. The vasa vasorum of the aorta showed changes in the intima identical to, that described in the coronary system. There was no lymphocytic infiltration in any of the coats of the vessels. The lung tissue had some scattered areas of scar tissue, in which areas of hemorrhage were present. The small arteries showed normal adventitia but marked proliferative changes in the intima extending into the media. The endothelium was intact. Proliferative changes were also found in the small and medium-sized arteries of the thyroid gland, in the intestinal tract, the liver, the spleen and the pancreas. The vessels of the hepatic circulation were especially badly damaged because of the thickening of the intima. Some sections showed atrophy of the liver cords and some hemorrhages were present. The right kidney showed a very marked and well distributed vessel damage consisting of proliferation of the intima. Atrophy of the parenchyma of the kidney affecting glomeruli as well as the tubules was pronounced. Identical lesions were found in the shriveled portion of the left kidney. This seemed to be essentially an endarteritis resulting in occlusion of the lumen with destruction of the

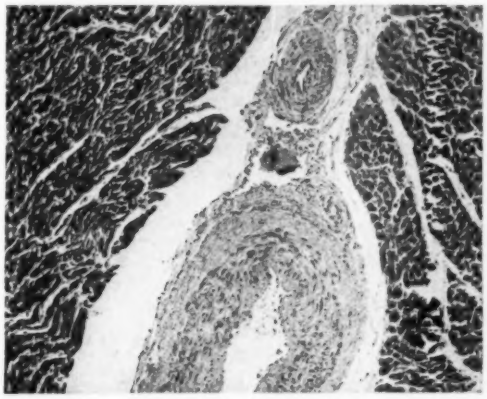

Fig. 8 (Pfingst). Heart muscle. There is some proliferation of the inner coat of the large artery, and here are marked similar changes of its small branches. The muscle cells are hypertrophied and their nuclei are pyknotic.

parenchyma secondary to the loss of its vascular supply. In the skeletal muscles many of the blood vessels were markedly damaged by hyperplastic thickening of the intima. The pathology was present in small vessels and arterioles and in some vessels measuring several hundred micra in diameter. None of the specimens examined showed any signs of leukocytic infiltration. The small vessels of the brain were markedly damaged by proliferations of the intima as noted elsewhere.

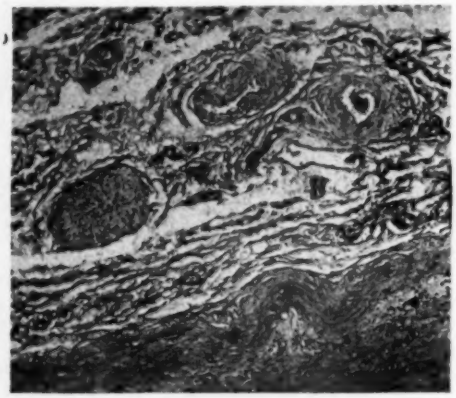

Fig. 9 (Pfingst). Adventitia of aorta and a portion of media. The vasa vasorum are damaged by hyperplasia of the intima, one of them completely occluded; areas of degeneration are shown in the media.

A few damaged vessels were also found in the choroid plexus.

"Sections of the remnant of the left eye show scar tissue at the distal edge of the sclera. The scleral vessels were characterized by the same hyperplasia of the intima and an absence of leukocytic infiltration found in other organs. Small pieces of cornea found in the blood clot appeared normal. Remnants of retina and choroid could not be found.

"In sections of the right eye a blood clot, partly organized and clinging to the wall was found filling the vitreous chamber. Posteriorly portions of the choroid were found but the retina was absent. The choroidal arteries had very narrow lumina, the intima being thickened through cellular hyperplasia, many being occluded. Small portions of the cornea were found in the clot anterior to the eyeball, the cornea evidently having been separated from the sclera at the point of junction. The fragments of cornea were apparently normal, showing no evidence of leukocytic infiltration. Blood vessel changes were observed in the sclera identical with those described in the left sclera. Sections from most of the viscera, the brain and the eye were stained for treponema pallida, but none were found.

"Summary: A general and widespread productive endarteritis with no

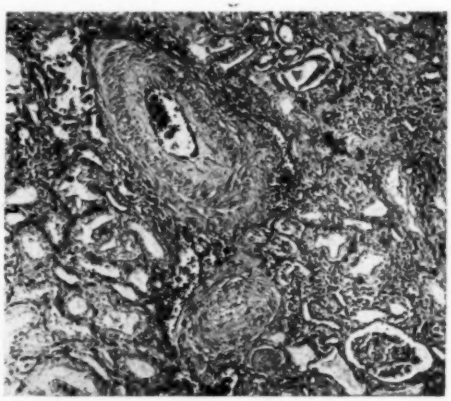

Fig. 10 (Pfingst). Kidney. The smaller arteries are completely occluded by proliferation of the intima. Secondary disintegration of the parenchyma followed.

evidence of inflammatory infiltration anywhere with secondary destruction of one kidney, the formation of a brain cyst and the destruction of the corneae of both eyes. Cause of death, a terminal pneumoccus meningitis most likely of otitic origin, coincident to the blood vessel changes but having no direct causative relation to it."

The interpretation of the pathogenesis of the corneal necrosis in our case is a difficult problem though it is probable that the obstruction of the arterial supply through the anterior ciliary vessels brought about trophic disturbance in the corneae and secondary gangrene and that the slow bleeding with clot formation took place through those vessels that were only partially obstructed. The relation of the meningeal disease to the blood-vessel changes is problematical though it is a fair assumption that the meningitis was

of coincident occurrence and had no bearing on the vascular pathology either as cause or result. In fact, etiology of the endarteritis is most obscure as none of the probable causes which have been assigned to blood-vessel disease could be demonstrated in this case. The previous existence of a disseminated choroidal disease and the general poorly nourished body of the patient would lead one to suspect the presence of a blood taint, yet the negative Wassermann reaction to blood and spinal fluid and the repeated examination for the spirochaeta with negative result would not uphold a diagnosis of lues.

In a careful review of the German, English, and French literature we were able to find a few reported cases in which a general blood-vessel disease prevailed, which markedly resembled our case. However, no report could be found in which reference was made to extensive involvement of the eyes.

D. Perla and B. Seligman[11] reported the case of a woman of forty-seven years, in which the autopsy revealed a diffuse obliterating endarteritis of unknown origin involving the medium-sized and small arteries of the heart, brain, thyroid, lungs, kidneys, and extremities together with an organized occluding thrombosis of the interior vena cava. J. McMichael[10] recently reported a case of extensive visceral endarteritis obliterans which was identical to our case except for the absence of ocular involvement and in that an organized clot had formed in one of the visceral arteries. It occurred in a girl eighteen months old in whom the main clinical features were general malaise, fretfulness, fever and some gastro-intestinal disturbance. A diagnosis had not been made but the autopsy disclosed a generalized visceral endarteritis with hyperplasia of the intima, slight involvement of the media and complete absence of involvement of the adventitia with infarcts in various organs. An organized thrombus was found in the superior mesenteric artery to which was assigned the cause of death.

We were able to find only two cases of endarteritis obliterans reported which were associated with involvement of the eyes. One was a case of endarteritis obliterans reported by D. Schramm[12] in which both cheeks dediscoloration and in which both retinae showed numerous white spots along the course of the blood vessels and a few small hemorrhages. Vision was markedly disturbed. There was no pathological report.

More recently E. B. Gresser[13] reported a case of bilateral partial occlusion of both central retinal arteries and

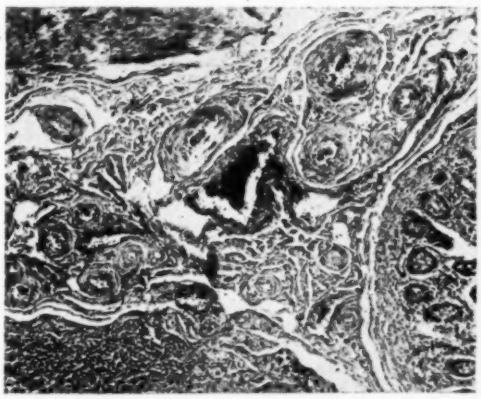

Fig. 11 (Pfingst). Submucosa of stomach. Many of the small arteries are partly closed by proliferation of the intima. The veins are not damaged here or elsewhere. No ulcerations of the mucosa were present.

veins in a Russian Jew, aged fifty-six years, who had lost both legs of thrombo-angiitis obliterans nine or ten years previously. He attributed the vascular disease in the eyes to a thrombo-angiitis of the central vessels, though there was no opportunity to corroborate this by microscopic examination.

Conclusions

As our clinical experience with blood vessel disease is limited and as our laboratory study is confined to the one case represented in this report we would not presume to enter into a discussion regarding the classification of the various phases of vascular disease. In our case the marked cellular hyperplasia of the intima with but a slight proliferation of the middle coat, the ab-

sence of changes in the adventitia, the absence of infiltration of the middle and outer coat and the absence of pathology in the veins would lead to the conclusion that we were dealing with a primary endarteritis. Whether or not the case would eventually have followed the precepts of most of our American pathologists in that the outer and middle coats of the arteries would eventually have participated in the hyperplastic process with a resulting occluding organized clot, must necessarily remain speculative. The outstanding and unusual features of the reported case were:

First: The marked histological changes that prevailed in the intima of the small arteries in all regions of the body with little or no involvement of the other arterial coats.

Second: The absence of pathology in the veins.

Third: The absence of organized clots in arteries and veins.

Fourth: The absence of gangrene or even of ischemia of the extremities.

Fifth: The presence of infarcts in the kidneys and brain.

Sixth: The damaged arteries of the sclera and choroid of both eyes and the gangrenous destruction of the entire cornea of both eyes.

Seventh: The occurrence in a youthful patient—aged nine years.

Eighth: The occurrence in a female.

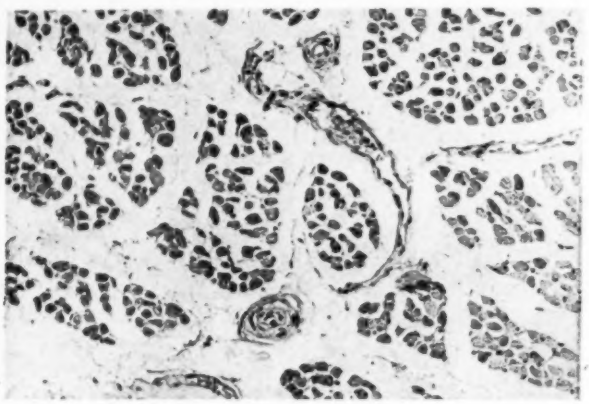

Fig. 12 (Pfingst). Skeletal muscle. Two arterioles are shown, both of which have marked damage by proliferation of the intima.

In conclusion we would express our gratitude to Dr. Charles Beck for permitting us to publish this case and to Dr. A. J. Miller for his interest and cooperation in the report.

Heyburn building.

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SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

BALTIMORE CITY MEDICAL SOCIETY

Ophthalmological section

February 25, 1932

Dr. Alan C. Woods, chairman

Probable unilateral retinitis pigmentosa

Dr. Angus L. McLean presented a patient, aged forty-eight years, who had noticed some impairment of vision in the left eye; this was found to be 20/40, with correction of a moderate myopic astigmatism. The pupil reacted quite well. His right eye was normal in all respects.

In the fundus of the left eye were seen many pigmented spots in the form of bone corpuscles, more noticeable in the periphery and fading out toward the disc, distributed in some places along the blood vessel. In addition, there were a few white spots typical of retinitis albicans; pallor, and a waxy appearance of the optic disc; rather narrow retinal arteries. The visual field was contracted concentrically for white and colors. Light sense was reduced.

Family history as to ocular trouble was negative. The blood Wassermann was negative. Recently a kidney had been removed for calculus, and later a second operation for papillary carcinoma of the ureter was performed.

There were about eleven cases reported in the literature as typical unilateral retinitis pigmentosa, and nine atypical cases. Many authorities doubted the existence of unilateral retinitis pigmentosa. Text-books stated that it was a bilateral condition. Objections made against cases reported as unilateral retinitis pigmentosa were:

1) The normal eye might be affected in the future. Against this, a case had recently been reported, observed for six years, in which the good eye remained perfectly normal, while the condition in the left eye progressed steadily.

2) The condition was an acquired choroidal atrophy with pigmentation. Syphilis was often blamed. However, Doctor Friedenwald reported a case with syphilis, having the ophthalmoscopic appearance of retinitis pigmentosa. After autopsy, the microscopic sections were quite typical of retinitis pigmentosa.

3) The pathogenesis of retinitis pigmentosa was unsolved. If classed with ophthalmic abiotrophies, it was hard to understand how an inherent deviation of the vital forces could be limited to the neuro-epithelium of one eye.

Cyst in the vitreous

Dr. Angus L. McLean also presented a ten-year-old patient who had an old quiet central choroidal lesion in the right eye, and a few scattered pigmented choroidal lesions in the left eye. In the right eye there was a small symmetrical, globular-like body about a quarter the size of a pea, apparently lying just in front of the retina above and temporal to the macula. With movements of the eye, this body appeared to move about quite freely, over a limited area, always returning to the same location.

Litinsky recently reported a similar example but bilateral, in a patient with retinitis pigmentosa. He believed these globular bodies were attached to the retina by fine transparent fibers and gave two possible explanations for the presence of such bodies in the vitreous: first, an inflammatory or degenerative condition of the retina or choroid, which had led to changes in the vitreous; second, they might be looked upon as a peculiar retrogressive formation of the vitreous of the embryonic eye; probably also associated with hyaloid artery and hyaloid canal.

Subconjunctival lymphoma

Dr. Richard L. Paton presented the case of R. S., a white woman aged forty-seven years. During April, 1931, the patient began to have "gritty sensation" in right eye with slight conjunctival injection and two months later she no-

ticed a swelling on the upper part of the eyeball.

On the right eye there was a gelatinous mass beneath the conjunctiva bulging over the corneal margin extending temporally and nasally, almost to the horizontal meridian. There was very slight tenderness on pressure. The eye was normal otherwise as was the left eye. The history was irrelevant. The Wassermann reaction was uncertain; she was positive to 1/100 mgm. of tuberculin. There was a small nodule over the right sacroiliac joint thought to be a lymphoma.

Discussion. Dr. Wm. H. Wilmer said that the literature contained many cases reported as brawny scleritis which in reality belonged to the same group as the present case. The absence of pain and uveal involvement strongly suggested a tumor and not an inflammatory process.

Dr. Jonas Friedenwald recalled a patient with a similar growth which extended into the palpebral conjunctiva. He felt that brawny scleritis and lymphoma were not similar in pathological appearance.

Dr. C. A. Clapp believed that many different types of cases were diagnosed brawny scleritis. Stephenson's case of brawny scleritis was quite similar to the one presented by Dr. Paton. The question of pain was relatively important, although a scleritis might be superficial and painless.

Ancient Chinese ophthalmology

Dr. Eugene Chan presented a paper on this subject. He traced the development of ophthalmic knowledge back to the dawn of civilization, briefly discussed the beginning of Pa Kaw and the Yin-Yang theory. Shen Nung, the Father of Medicine, who lived forty centuries ago, originated the use of drugs. Huangti, who followed him, added anatomy to our science. Pien Chiao, 255 B.C., introduced a narcotic wine and Hua To, 190 A.D., an effervescing powder for surgical anesthesia. The establishment of state medical examinations, institutions of learning, and government clinics before the Christian era was particularly notable. Yin Hai Ching Wei, a book on the diseases of the eye written some time between the seventh and eighth century A.D. was given as a typical example of early ophthalmic literature. The colored pictures, portraying various ocular syndromes were quite vivid.

Since many of the remedies employed by the ancients were indispensable to us, the author cherished the hope that other therapeutic measures might be rediscovered for the treatment of baffling conditions. The description of surgical instruments was of special interest. The old armamentarium certainly bore a striking resemblance to that of today.

The author quoted the following account on cataract: "At the onset of the disease, dimness of vision prevails, as if one were gazing through clouds. There is neither pain nor itching. Occasionally diplopia may be present. The visual impairment progresses in proportion to the lenticular opacity. Finally there is a complete loss of sight. A day is selected for operation. Stormy day, rainy day, cloudy day and hot or cold day are unsuited. Before the operation, a moderate amount of soft diet is prescribed. At the time of the operation, the patient is required to sit upright on a stool facing the daylight. An assistant steadies the patient's head with his hands. The patient is forbidden to talk or shout. The surgeon should not become nervous; otherwise his hands would tremble. After the operation, the eye should be covered with five or seven layers of soft paper, on top of which black beads wrapped in soft cloth are snugly tied in order to close and immoblize the lids. This operation is not indicated if the patient has a cough. After the surgical performance, the patient is put to bed and is told to lie still on his back. Full diet is not allowed on the first day. A small quantity of liquid food may be administered if he complains of intense hunger. Seven days later, the dressing can be discarded. Nutritious diet is then given."

Henry F. Graff,
Secretary.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY

November 19, 1930*

Dr. George B. Potter, president

Recurring epithelioma of orbit

Dr. Swab presented Mrs. H., white, aged seventy years, who had first sought his services on July 6, 1928, for an epithelioma of the left eyeball and lids. The growth had started in the skin about three centimeters external to the outer canthus seventeen years previously. There was a history of treatment with pastes, ointments, x-ray, radium, and electro-coagulation. The globe became involved during the year of 1928 and blindness had been complete since May, 1928. On July 18, 1928, an exenteration with an electric cautery knife was incompletely done, due to poor tolerance to ether. The globe and lids were removed, together with much of the orbital soft tissues. Radium was applied two or three times up to May 14, 1929, when recurrence was suspected. Examination of a biopsy specimen showed basal-cell epithelioma. Further operation was refused until there was active ulceration of the soft tissue in the orbit which also involved the superior orbital brim. On September 14, 1929, complete exenteration by cautery was done, the periosteum coming away cleanly. Examination on May 14, 1930, showed recurrence in upper, inner angle of the orbit in what had previously appeared to be healthy granulation tissue. On May 24, 1930, electric cauterization of the affected area which was found to extend into the left frontal sinus, was again performed. On September 30, 1930, the tissues of the orbital cavity were quiet except at the nasal side where they were spongy and could be perforated with a probe. X-ray films showed the left frontal sinus to be filled with an opaque substance, probably a recurrence of the neoplasm. The patient consented to another operation on November 19, 1930, which is planned for next week. Her general condition is good. She has had no pain since her first operation and has gained over thirty pounds.

Discussion. Dr. Rubendall advised proceeding according to the outlined plan; that is, enlarging the opening into the sinus from the orbit, evacuating the contents of the sinus, cauterizing with electric cautery and following up with radium.

Dr. Judd asked if the periosteum having been left intact, or at least not completely removed, had been the cause for the recurrences.

Dr. Swab answered that the periosteum had not been left through choice at the first operation as a classical exenteration had been intended. He had encountered a similar difficulty in an elderly patient four years ago and even though the periosteum was not removed then or later, the patient was apparently cured. This was also a case of basal-cell epithelioma. During the past summer he had seen sections of a retrobulbar epithelioma that was operated upon by Guist of Vienna in which it was assumed that the growth had developed from the orbital periosteum. He added that in any similar case he would attempt to remove the periosteum, as doing so undoubtedly lessened the tendency to recurrence.

Keratoconus

Doctors Davis and Rasgorshek presented J. R., a female, aged twenty-three years, who observed failing sight for the past two years. Vision of each eye was 6/30 and was unimproved with lenses. There was a definite increase in the corneal curvature of each eye, somewhat irregular but with all curves approaching a more or less central point. No opacity could be detected in either cornea by means of the ophthalmoscope or oblique illumination. The fundus details appeared markedly distorted. General examination had not yet been made to determine the possibility of endocrine relationship.

Dr. Judd agreed with the diagnosis and stated that the slitlamp

* The editor of the Journal regrets that this Society Proceedings was overlooked in his files for many months. Hence the delay in publication.

would probably demonstrate the existence of a Fleischer ring. He suggested that further efforts be made to correct the ametropia as such patients could sometimes be greatly benefited with suitable lens combinations.

Dr. Potter said that the case seemed to be a relatively early one, with a history of but two years' visual failure. For this reason it seemed expedient to make a careful survey of the general condition. Contact glasses might be better at this stage than an operation.

Indirect ocular concussion

Dr. Young presented B. G., white, male, aged sixty-six years, who was knocked down by an automobile two years ago. He was unconscious for twenty-four hours and suffered a severe contusion of the left side of the head and face. Since that time the vision of his left eye has been greatly impaired. Vision was O.D. 20/40, correctable to 20/20; vision O.S. was 3/200, not improved with correction; small lacerations of pupillary border, iridodonesis, moderate increase of tension, weak pupillary reaction, and gray fluffy material in anterior chamber were seen in the left eye. There was a rupture of the zonule below, which allowed the lens to become almost completely dislocated backward into the vitreous when the patient lay upon his back, but the hinge of the superior zonule brought it back into position when the patient sat or stood erect. With the hand slitlamp, vitreous could be demonstrated in the anterior chamber.

Discussion. Dr. Judd said that it was a somewhat unusual ocular lesion following head trauma. The case illustrated that the inferior zonular fibers are the weakest, a point that of which practical use was made in intracapsular operations.

Dr. Swab observed that the case was of interest from the standpoint of the prognosis. Since cases with partial dislocation of the lens finally acquire secondary uveitis or secondary glaucoma, operative intervention must be considered before the eye became more definitely diseased. Even at this time increased tension existed. As the removal of such a lens is at best a risky procedure, one should give a guarded prognosis.

Acquired nystagmus

Dr. F. W. Dean presented J. S., aged ten years, wearing correction, +3.50 D.cyl. ax. 105° on the right and +2.50 D.cyl. ax. 95°, on the left. When looking to the front, nystagmus was present, increasing to left. Eyes were quiet when looking to right. This condition had existed since early childhood. The mother said the boy recently had had a tenotomy of the right internal rectus and a tuck of the left external rectus without improvement.

Under atropine the refractive error was: O.D. + 1.50 D.sph., ⌯ + 3.00 D.cyl. ax. 105°, ⌯ 1Δ, base down: O.S. + 1.50 D.sph. ⌯ + 3.00 D.cyl ax. 90°, ⌯ 1½Δ, base up. With this correction there was nystagmus on looking to the left and very slight if any when looking straight to the front. This correction without the prisms did not relieve the nystagmus on looking to the front. However, the hyperphoria could not have been a causative factor, as the nystagmus was present before the fusion sense was developed.

Charles M. Swab,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

February 16, 1932

Dr. David W. Wells presiding

Retinitis punctata albescens

Dr. Baier presented this case for Dr. Regan. The patient, a white man twenty-nine years of age, first came to the Infirmary on January 25, 1932, complaining of poor vision, especially at night, since childhood. The external examination was negative. Vision with correction was O.D. 20/200; O.S. 20/200. There were numerous small white spots throughout the retinae, more numerous in the periphery, but fairly well covering the maculae. Visual

fields were not contracted. There was a central scotoma, in each eye.

Two sisters and one brother had a similar condition. The parents and grandparents had no eye trouble, nor did members of any branch of the family. A diagnosis of retinitis punctata albescens was made.

This type of retinal affection, according to de Schweinitz, was originally described by Mooren who maintained that this condition was characterized by striae or circular spots scattered over the fundus, resembling in color, the reflex of the sclera. The retinal vessels were not covered by the spots. The disc was decidedly gray. A relative or absolute scotoma might be present.

Hershberg gave the name central and punctate retinitis. Fuchs called attention to the similarity of this disease to retinitis pigmentosa, in as much as it was either congenital or started in infancy; affected several members of the same family; occurred in children of blood relations; also, there might be night-blindness and contraction of the visual fields. It should be regarded as a primary degeneration of the retina, and should not be classified as an inflammatory disease. Leber classified the condition as a form of non-pigmented tapetoretinal degeneration, and believed that the white spots represented partly calcified colloid excrescences of the lamina vitria (drusen).

Discussion. Dr. Greenwood said that, except for the absence of the typical bone-corpuscle-shaped areas of pigmentation, these cases were similar to those of retinitis pigmentosa.

Herpes zoster with ocular involvement

Dr. Gundersen (by invitation) showed three cases, all having started in January. All had nasal vesicles and uveitis. One had corneal vesicles, another, marked keratitis of the nasal half of the cornea and the third, a child, showed patchy infiltrations of the stroma. Pain was severe in the first patient, slight in the child. Vitreous opacities developed in the first patient; there were no muscle paralyses; blood Wassermann tests were negative and the histories irrelevant.

Staphyloma of the sclera

Dr. J. H. Waite presented a girl of fifteen years whose father had noticed, three years ago, a small black speck on the upper nasal quadrant of the right sclera, that had gradually increased in size. There was a small scleral staphyloma. 3 x 5 mm., situated 5 to 6 mm. from the limbus in the upper nasal quadrant, and elevated about 2 mm. from the scleral surface. The overlying conjunctiva moved freely. By transillumination, light easily penetrated the staphyloma. No fundus pathology could be found, and no history could be obtained of trauma or of inflammation. The tension of each eye measured 15 mm. (Schiötz). It was proposed to attempt to reinforce the attenuated sclera by means of a fascial transplant.

Early sarcoma of the choroid

Dr. W. P. Beetham reported the case of a patient, forty years of age, who stated that, following a hysterectomy four months ago, she noticed blurred vision. Along the course of the superior temporal vessels in the right eye there was a mottled slate-gray region two to three disc areas in size, slightly elevated and with an indistinct, serrated edge. By transillumination, the pigment could be seen to extend down and below the macula. These changes were all behind the retina. On top of this area was a small hemorrhage. Visual acuity was 6/60. There was an absolute field defect corresponding to the lesion.

The left eye was entirely normal, with a visual acuity of 6/6.

Dr. Beetham believed that the patient had had a benign melanoma of the choroid, which had recently undergone malignant transformation.

Dr. Wagner had reported the case of a woman, fifty-two years old, who had a melanoma. Three years later a sarcoma had developed at the site of the melanoma. Wagner believed melanomata to occur as frequently as one in one hundred patients examined routinely.

Benign melanomata were flat, slate-gray or blue-ointment in color, about one disc diameter in size, and with a sharp border. They were covered by Bruch's membrane; the chorio-capil-

laris and pigment epithelium was intact. Foster Moore stated that malignancy was probable when subjective visual symptoms were noted, when there was a partial scotoma, when irregular pigmentation and ill-defined edges existed. The case under discussion showed all these signs.

Hemangioma of the orbit

Dr. Beetham presented this case at the last meeting, and at that time, he had planned to remove the remaining portion of the tumor.

The orbit was opened by the Krönlein method. A fairly large, highly vascular mass was found, rather firmly applied to the roof of the orbit, extending deep into the apex. It was impossible to remove the entire mass, but a large portion was excised with the electrocautery. Pathological examination of the tissue revealed adenocarcinoma, instead of the hemangioma which, from the biopsy, Dr. Beetham and others had been led to believe existed.

New trephine operation

Dr. F. H. Verhoeff demonstrated a new trephine operation with the von Hippel trephine.

Utilization of sugar by the retina

Dr. F. H. Adler read a paper on this subject.

Discussion. Dr. Waite asked if the retina derived its sugar from the choriocapillaries, or from the capillaries of the ciliary body by diffusion through the vitreous; were the fragments of the sugar molecule burned, or re-synthesized; did sugar metabolism in the retina aid in photochemical processes?

In the retinas of diabetics, Dr. Waite's opinion was that damage could not be laid directly to sugar or to acid bodies. In severe diabetes in young patients, it was unusul to find with the ophthalmoscope, any retinal pathology, and likewise unusual to find any alterations in light, form or color sense. The retinal changes in diabetes were not yet fully explained, but must be due to damage to the capillary walls sufficient to account for the types of hemorrhage found.

James J. Regan,
Recorder.

ST. LOUIS OPHTHALMIC SOCIETY

March 25, 1932

Dr. Julius H. Gross presiding

Hyperphoria and the prolonged occlusion test

Dr. Carl T. Beisbarth read a paper on this subject which appeared in this Journal; v. 15, no. 11, p. 1013.

Discussion. Dr. Wm. F. Hardy felt that the prolonged occlusion test was not always of value; as the use of atropin might bring out a total amount of hyperopia for which full correction could not be worn, so a total hyperphoria might be discovered, only a portion of which should be corrected by prisms. There was a latent hyperphoria as well as a latent hyperopia. He said that hyperphoria depended on three factors, anomalies of innervation, of muscle structure, and of insertion, and that it seemed hardly right to assume that the majority of cases of hyperphoria depended on an innervational condition since other factors might be present. He felt it difficult to agree with Dunnington and White that most cases were on a paretic basis. As this meant partial paralysis he was inclined to question the contention and felt proof was lacking. As a practical measure he thought Dr. Beisbarth had demonstrated that we could not rely on the occlusion test altogether even if it were not so inconvenient.

Dr. John Green said that he and Dr. Beisbarth had been using prolonged occlusion in selected cases for a number of years but not sensing the possibility that Bell's phenomenon might be a factor in the result had not always noted in the record which eye was occluded. In fact, in less than one-fourth of their cases was the occluded eye specified since they had assumed that it did not matter which eye was cov-

ered, but that the result depended on dissociation of the eyes.

He felt the figures on the twenty-nine cases reported were the more valuable since the records were made with no idea that they would disclose upward deviation of the occluded eye. This small series, he said, bore out Abraham's contention that Bell's phenomenon was a positive factor in the position of the eye after prolonged occlusion, and that such a position did not represent a true measure of the hyperphoria.

Dr. F. E. Woodruff asked whether any account was taken of the hyperphoria in the reading position as compared with hyperphoria for distance.

Dr. C. W. Tooker noted that in some cases the total hyperphoria was determined by short occlusion and in others after longer occlusion. He thought it would be of interest to know the length of time necessary to bring out the total hyperphoria. He also thought it almost as important to know the total hyperphoria as to know the total hyperopia. He had found it possible to determine hyperphoria by gradually increasing the strength of prism for several hours while the patient was in the office.

Dr. B. Y. Alvis called attention to a recent paper by Marlowe in which he had shown that in some cases the total hyperphoria became manifest after two or three days occlusion while others might require seven or ten days or longer before the full amount was evident. Dr. Alvis felt that the amount of correction the patient would accept in proportion to the total amount of hyperphoria varied with different patients. He recalled a case in which there had been twelve degrees manifest hyperphoria measurable with the Maddox rod without any period of occlusion. The patient had had no diplopia and had been made comfortable with five degrees of prism correction.

Dr. Wm. M. James had tried alternate occlusion of the eyes in a few cases showing low manifest hyperphoria, one-half degree or less. In two cases the hyperphoria had increased alternately in the occluded eye. Apparently the eye under cover had tended to deviate upward. In most cases the findings after occlusion agreed closely with the manifest muscle balance. He said that if we accepted the teachings of Duane, Dunnington and White that most vertical inbalances were of paralytic origin, he felt the results of the occlusion test must be interpreted with reference to whether the sound or the paretic eye had been covered. Theoretically, it seemed that the result of occluding a paretic eye should differ from that obtained by covering a sound eye.

Dr. H. J. Howard thought it would be well to determine if the muscle were paretic by tangent screen tests and then try alternate occlusion to see if the same results were obtained.

Dr. Beisbarth, closing, said his effort had been to show the tendency of the covered eye to deviate. The point was not the time the eye was occluded nor how much hyperphoria was disclosed but that it always developed in the occluded eye.

B. Y. Alvis,
Recorder.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

Annual Congress, at University of Edinburgh

May 12, 13, 14, 1932

DR. A. H. H. SINCLAIR, president

Ocular tuberculosis

Dr. Josef Urbanek (Vienna) said that for a long time tuberculosis was not accepted as a causative agent in eye diseases because physicians reported that no tuberculosis was found in the lungs. Yet the lungs were not normal in cases having uveitis and other inflammatory eye diseases, as revealed by x-ray. The forms of proliferating tuberculosis most found in eye cases showed the mildest and the fewest symptoms and signs: in those cases the tubercle bacilli seemed to lack the ability to produce the typical granulation tissue with central caseation, or even typical giant-cell formation. The only sound method of specific diagnosis consisted in the

use of one of the subcutaneous tuberculin tests. At the speaker's clinic some 100 adult patients with kerato-conjunctivitis scrofulosa were tested and a majority reacted positively. All such patients were given a course of tuberculin. That tuberculosis played an important rôle in the etiology of episcleritis and sclerosing keratitis was proved by the finding of tubercle bacilli in the blood stream.

Tryparsamide in treatment of syphilitic optic atrophy

Mr. David Lees spoke of his treatment of forty-eight cases of optic atrophy due to syphilis, out of 13,000 cases of venereal disease at the clinic. He praised the method; said atrophy could be checked; the patient could continue ambulant while under treatment.

Syphilitic tarsitis

Mr. Maurice Whiting said this was the rarest of syphilitic affections of the lid. He presented a single woman aged twenty years, with four swellings in the lower left lid and a general thickening of the tarsal plate, of three weeks' standing. The largest was the size of a hazel nut. The conjunctiva was pale and waxy looking, and seemed to be more closely adherent to the deep surface of the swelling than to the normal tarsal plate. There was neither pain, tenderness nor glandular enlargement. Though the Wassermann test was negative he felt sure the case was syphilitic, so treatment with neosalvarsan had been started, and after the second injection the swellings became half their former size.

Dacryocystorhinostomy

Dr. H. M. Traquair said that the aim in the treatment of chronic dacryocystitis was the restoration to a normal state, but no method had been so successful. The two most satisfactory methods were excision of the sac and drainage into the nose. Meller, who strongly advocated excision, said that most patients complained very little or not at all of lacrymation. In Dr. Traquair's clinic in the last three years 161 patients were operated upon for dacryocystitis, and 53 excisions of the sac were done. Toti's operation was done on 113 cases (14 times on both sides) or 127 external dacryocystorhinostomies: and of 117 of the latter who replied to an enquiry as to their state 71 percent said there was now no watering. Of 48 excisions no tearing was reported in 21, or 44 percent.

Senile cataract

Dr. A. J. Ballantyne dealt, in his opening paper, chiefly with postoperative complications and the measures best calculated to prevent them. Local and general physical conditions should be carefully investigated before operation. Rigid antiseptic procedures were suggested for preparing the conjunctival sac. Acriflavine had been valuable in his hands. In postoperative glaucoma apparently the best results followed iridectomy and trephining opposite the cataract wound.

Sir Arnold Lawson said that he regarded most of the antiseptic washings of the eye and the precautions against contamination usually adopted as unnecessary and irritative. He had injected cultures of B.xerosis, staph. albus and citreus into the rabbit's conjunctiva, always with negative results. One should merely exclude the presence of a conjunctival discharge, for there was always a discharge when a dangerous organism was present.

Sir Richard Cruise said he always gave a sedative before operating: and if there seemed to be any danger of hemorrhage, he used hemostatic serum.

Mr. R. Foster Moore criticized the Barraquer method because of the frequent loss of vitreous. He felt that no intracapsular extraction method would stand the test of time, largely because of vitreous loss.

Epibulbar squamous-cell carcinoma

Mr. Charles Goulden and Mr. H. B. Stallard contributed a paper on two cases of this condition. They said that when such a growth began there were usually no subjective symptoms, and usually it had attained the size of a pea before the attention of the patient or his friends was directed to it.

Intracranial resection of the optic nerve in glioma retinae

Mr. Norman M. Dott and Mr. Spence Meighan contributed a joint paper on this subject. Dr. A. B. Reese, of New York, had stated that relatively modern statistics showed that of eyes removed for glioma retinae, 52 percent showed invasion of the optic nerve, and 81 percent of these invaded nerves showed that severance of the nerve at enucleation was distal to the disease extension. Therefore, 43 percent of all cases of enucleation were doomed to failure before the patient left the operating room. Yet glioma retinae was a tumor which long remained confined by the fibrous walls of the eyeball and optic nerve, showing little tendency to invade tissue other than its parent nervous tissue. Death resulted from a backward invasion to the optic chiasm and brain, not from local spread, nor from glandular or blood stream metastasis.

A child was shown who had had an enucleation in October, 1931, for glioma. The tumor filled the eye completely but the sclera was intact. Seven days after the operation the orbit was re-opened and an attempt made to secure more of the remaining nerve at the apex of the orbit. Fourteen days after nucleation, in a further attempt to arrest the disease, a radium bomb was directed on to the orbit for two 48-hour periods. But, in view of the bad prognosis in these cases, it was felt that the occasion demanded intracranial resection of the optic nerve, and this was done, the entire length of the optic nerve being removed up to the optic chiasm. The region became infected, but this later subsided, and the child's health had since been excellent.

(Reported by H. Dickinson).

CHICAGO OPHTHALMOLOGICAL SOCIETY

April 18, 1932

Dr. Frank Brawley, president

Sympathetic inflammation

Dr. William A. Fisher presented a seventy-two-year-old man with inflammation of the right eye. A cataract operation had been performed upon the left eye in October, 1931. On March 25, 1932, the left or operated eye was blind, red, soft, and tender, with no perception or projection of light. The right lens was opaque, the eye red, and so soft that the tonometer did not register. Perception and projection were fair. The pupils did not dilate with atropin. Blood chemistry, Wassermann, and spinal fluid were negative. X-ray of teeth was negative.

The left eye was removed. Autogenous serum was injected into his muscle daily. Atropin, dionin, and heat were given, but discontinued after three days because the pupil would not dilate. After fourteen days of daily injection of blood serum the tension was normal, perception and projection better, but the eye remained red and irritated. Salicylate of soda internally was added, thirty grains four times a day.

Microscopically, sympathetic opthalmia had not yet been demonstrated in the enucleated eye.

Diathermy in detachment of the retina and glaucoma simplex

Dr. Herbert Walker read a paper on this subject which will appear in this Journal.

Discussion. Dr. William H. Wilder said that one would suppose from what Dr. Walker had said, that diathermy produced its effect by obliterating the capillary circulation in that sector of the eye to which the bulb was applied. This would tend to support the theory of Duke-Elder, Hamburg and others, that eye fluids arose from the blood serum passing through capillary walls. If certain numbers of these capillaries were obliterated by the treatment there would be less fluid passing into the eye.

Dr. Robert von der Heydt asked why, in view of the fact that in secondary glaucoma there was usually a constant fluctuation between hypo- and hyper-tension, such eyes were chosen for this work? Why not confine the work to one type, for instance to definitely diagnosed cases of primary glaucoma?

Dr. Herbert Walker (closing) said there were no bad results, consequent-

ly there were no pathological specimens to show.

In reply to Dr. Gradle, the first case was one of detachment of the retina following cataract operation, which apparently had nothing to do with the detachment. Vision had improved and on close examination the detachment was not visible. The second case was complicated by hyalitis from an old injury. Partial reattachment was obtained, but vision was mere light perception. It would not be surprising if the detachment recurred as that type generally did. The next case was also a diseased eye in which a secondary cataract was forming. Partial reattachment was obtained. The next was an injury case in which the eye was blind. The reattachment in this case was perfect. The next case had a detachment of the retina and hyalitis, and a mouth full of crowns and fixed bridges. The patient's husband and doctor declined to urge dental care. The operation was then performed, and the detachment apparently became larger. This list comprised Dr. Walker's personal cases, the others were those in which he assisted at the operation.

In reply to Dr. Folk he said that the tension would be lower in twenty-four hours, completely reduced in forty-eight hours.

Intracapsular cataract extraction by the vacuum cup method

Dr. E. R. Crossley read a paper on this subject which will appear in this Journal.

Discussion. Dr. Robert von der Heydt said that he was given the opportunity to examine six cases on which Dr. Crossley had operated, as to the presence of a hyaloid membrane in the pupillary space. Three cases had a complete, taut hyaloid membrane behind which the vitreous was seen. Two cases had a membrane, but it bulged forward into the aqueous. The sixth case had a partial hyaloid membrane. There was an opening through which vitreous herniated until it almost reached the cornea.

Dr. O. B. Nugent said that an attempt to break the zonula as a whole, produced too much pull on the capsule. If the fibers were broken at one particular point, and there was a tear extending around from that point, it would be more successful; it was that which had made for Barraquer's success.

Dr. Edward Gallardo remembered that Barraquer said his method was not only by traction of the zonula but also by vibration. In applying his semispherical sucker he first held the lens in position and shook the capsule, having an even traction in every way. There was a certain amount of vibration which broke the fibers evenly around the lens.

Dr. William A. Fisher said that the operation described by Dr. Crossley was done with one hand, but he might have fewer ruptured capsules by releasing the erisiphake when the zonula was broken below, and finishing the operation by tumbling or turning the lens upside down, as described by Smith.

Dr. E. R. Crossley (closing) said that an effort was made to avoid even the slightest pressure on the lens, in order to preserve the hyaloid membrane intact; it would seem that tumbling the lens or external pressure would tend to break it.

In the original Smith-Indian operation four percent cocaine was used; it was found that a stronger anesthesia was required in some cases, as high as a fifty percent solution. Ten percent cocaine at five minute intervals, applied four times, and two instillations of adrenalin chloride, had been found to give excellent results.

Robert von der Heydt,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

June 20, 1932

Dr. Hilliard Wood presiding

De Blaskovics' operation for ptosis, report of one case

Dr. H. C. Smith reported the case of Mrs. W. H. R., aged sixty-five years,

who had complained of progressive drooping of both eyelids for ten years, during the last two of which vision had been obstructed

Vision in each eye with glasses was 20/20. The palpebral fissures were each 2 mm. in width; by marked frontalis action, they could be increased to 4 mm. No levator action was evident. The globes were both externally and internally normal.

Using local anesthesia, a 4 mm. resection of the levator of the right eye was done; the tarsus was freely resected and the fold-forming sutures were inserted approximately 5 mm. from the lid margin. The sutures were removed on the seventh day after the operation.

Eight days following the operation the patient developed an acute coryza and a marginal ulcer of the cornea, and subsequently several ulcers occurred along the lower nasal limbus of the right eye. Three weeks were required for the healing of the ulcers. One month after the operation, the right upper eyelid could be raised without effort to form a palpebral fissure 6 mm. wide. Twenty months later, the palpebral fissure could be opened to a maximum of 9 mm. The fold was present, but not as marked as would be seen on the surface of the normal eyelid.

H. C. Smith,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

April 12, 1932

Dr. David W. Wells presiding

Angioid streaks

Dr. W. D. Rowland presented a sixty-one-year-old woman who had been studied since May, 1928. She exhibited a well-developed Paget's disease of the bones; markedly enlarged skull, wide pelvis, and curved spine. The eyes showed typical angioid streaks of the retina of an ashy-gray color, radiating in several lines from the region of the disc.

Until recently, vision had been good, but, in the macula of the left eye, a large hemorrhage occurred about February 1, 1932. On April 5, 1932, vision, with glasses, was O.D. 20/100, Jaeger 6; O.S. hand motion at three feet.

Visual fields showed a para-central scotoma in the right eye, and a large central scotoma in the left eye, with an enlarged blind spot.

Bilateral caerulean cataract

Dr. W. D. Rowland also reported the case of a thirty-nine-year-old telephone lineman, first seen March 17, 1932, complaining of inability to read fine print, and indistinct vision for distance. Vision was 20/200 and Jaeger 11 in each eye. Pupils measured 4 mm. with almost no reaction to light. In the center of each pupil was seen very distinctly a white star. Around and behind this star was a great multitude of small dots which, under the slitlamp appeared in greens, blues and browns.

The stellate opacity was in the anterior cortex in the sutures of the adult nucleus. There was no evidence of a previous inflammation or effect of high voltage electricity. He had been carrying on his work, but, apparently, vision was slowly being reduced.

Xerophthalmia, four cases

Dr. H. B. C. Riemer presented the case of a girl, seven years of age, whose mother stated that two months before, she had noticed a peculiar white spot on the child's left eye. On the bulbar conjunctiva at the temporal limbus of the left eye, there was an oval-shaped, slightly elevated, grayish-white patch, about 4 mm. in diameter. The surface of the patch was dry, with a frothy appearance, typical of epithelialis xerosis. The right eye was normal.

Physical examination by the children's medical department revealed a healthy child otherwise. There seemed to be no dietary deficiency. A rich vitamin A diet was prescribed.

Next he presented the cases of three seamen who complained of night-blindness. They gave a history of shipping on the sailing vessel, *General Foy*, under Captain Brouneuf, on January 20, 1919. There were nineteen men in the crew, and five officers. They left the West Coast of Africa, and arrived in

Boston on April 21, 1919. During the voyage, almost all of the crew were ill. Three of the men developed night-blindness. This came on suddenly about two and a half months before they arrived in Boston. One of the men stated that he was all right at eight o'clock in the evening, and on his twelve o'clock watch discovered that he could not see. Another man became night-blind eight days previous to this.

During this cruise, the diet was as follows: yellow peas, salt pork, no potatoes, war bread which was composed of a mixture of various cereals, crackers coffee, fish which they caught, no butter, one and one-half pints of wine per day, no vegetable oils.

Of the three men examined, two showed definite night-blindness, and all had xerophthalmia. The night-blindness in one had disappeared by May 27; the other man did not return for further examination.

Xerophthalmia might be a symptom of vitamin A deficiency, or might be due to some local eye disease, such as trachoma, pemphigus, or in cases where there had been exposure of the conjunctiva or cornea.

Dr. Riemer stated that a recent study by Dr. Pillat of Peiping, China, would indicate that xerophthalmia was common in adults. He also said that he wondered if some of the ulcers of the cornea which were simply classified as ulcerative keratitis might not come under the classification of xerophthalmia.

Chemical keratitis from indelible pencil lead

Dr. R. H. Ruggles reported the case of a patient who had a "blue eye" for five days resulting from a foreign body of indelible pencil lead. The patient was not bothered much until the fourth day when pain and irritation were severe.

Dr. Ruggles saw the patient on the fifth day. Under the upper lid there was a sloughing membrane which was discolored blue. When this was removed, there was seen a good-sized hole in the upper lid. The whole cornea stained, this being deep in the nasal part at limbus.

Over a period of four weeks, healing was very slow with but slight epithelial growth over the site of greatest damage. Lately this site had become white, was necrotic and the eye very painful.

There was very little in the literature about this type of injury. He said indelible pencils were made of a composition of silver nitrate, manganese dioxide, with a clay filler, and analine dyes. The appearance was one of a caustic burn, the eye being cauterized wherever the lead struck. The silver nitrate caused the damage.

Discussion. Dr. Terry said that he took a piece of indelible lead from a pencil, and inserted it into the conjunctiva of a rabbit. There was no reaction for two or three hours. No marked irritation was noted until the following day. At that time, it appeared as if the conjunctiva had been cauterized. Each day he removed some collection of tissue which was covered with indelible lead dye.

Dr. Greenwood remarked that he had seen a case about twenty years ago, of a postal clerk who on the previous day was injured by an indelible pencil. On the morning following the accident, the right lid was tremendously swollen. Dr. Greenwood removed the piece of lead, but did not remove the stain of the cornea. An ulcer developed which healed only after a long period of time.

Dr. Liebman reported a similar case. A few hours after the accident the eye began to pain, and a blue stain in the bulbar conjunctiva was found. The patient remarked that everything seen with the injured eye assumed a yellow hue.

In the literature, cutting out strips of conjunctiva to remove the stain was advised. This was unsatisfactory so he finally tried acid alcohol. This procedure was painful for cocaine had no anesthetic effect. The eye showed no change until the following day, when it appeared to be perfectly white, the result being very good. Upon questioning a stationer, Dr. Liebman learned that different types of indelible lead pencils were composed of various kinds of chemicals.

James J. Regan,
Recorder.

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MIGRAINE DUE TO ALLERGY

In a great many cases migraine arises from extraocular sources, without apparent relation to eyestrain. But the attempt to relieve the sufferer from this distressing malady should always include examination as to the existence of uncorrected refractive error, and for the good of his patient the ophthalmologist ought to know what conditions outside his own limited field may be to blame.

In spite of the significance now attached to allergy in the whole field of medicine, DeGowin (The Journal of Allergy, 1932, volume 3, page 557) complains that important recent essays on migraine not infrequently omit any mention of the part played by allergy in the production of that disorder.

In 1923 Miller and Raulston reported treatment of twenty-five migrainous patients with intravenous injections of peptone, improvement resulting in eighty-four percent of the cases; and in 1927 Vaughan related ten cases in which migraine was relieved by elimination of specific foods. In Eyermann's series of cases the symptoms disappeared upon elimination of proteins to which the patients reacted, and reappeared upon renewed administration of such specific proteins. The hereditary character of migraine has been attributed to an allergic inheritance; and it must be remembered that dietetic habits are particularly apt to be handed down through successive generations.

DeGowin, working in the Department of Internal Medicine of the University of Michigan, has studied sixty patients, all of whom were given the same protein sensitivity tests. In the course of half a day it was possible, without considerable inconvenience to the patient, to test for thirty pollens by the scratch method, and for over one hundred foods, epidermals, and miscellaneous substances by the intradermal method. Treatment consisted wholly of elimination of the foods to which the patient reacted, or, where these were too numerous, the use of selected diets.

All the patients gave some positive skin reactions. The only reactions to pollens were in patients who had hay fever. Eighteen percent of the patients had allergic symptoms other than migraine. Seventy-one percent gave a history of migraine in blood relatives, and allergic manifestations other than migraine were recorded in the families of fifty-one percent.

Of forty-two cases in which it was possible to obtain satisfactory data as to the results of treatment, DeGowin records complete relief in fourteen and partial relief in nineteen, or a total of thirty-three cases (seventy-eight percent) in which there was some beneficial result from treatment. The most striking results were obtained in nurses and other hospital employees who could be closely supervised. There were some cases in which psychic upset played an important part.

The list of foods to which sensitiveness may be displayed is a formidable one, and one shudders to think of the treachery that may lurk concealed at the dining table. Experience with the use of selected diets showed that, in the production of migraine, some of the foods to which the patient was sensitive often played a more important part than others to which he likewise reacted.

Researches by Rinkel and Balyeat on cellular sensitization (The Journal of Allergy, 1932, volume 3, page 567) indicate that different foods may be responsible for a variety of symptoms in the same patient. Thus one patient suffered from severe headache after ingestion of even very small amounts of apple and pecan; from hives after eating grapes; from gastrointestinal symptoms after partaking of corn or cherries; and from vasomotor rhinitis after contact with orris root or goose feathers, or after an excess of wheat in his diet.

The two authors last mentioned point out that a patient should not be tested by laboratory methods alone, but that clinical testing should always form a part of the diagnostic investigation. Reports concerning allergic diseases should indicate whether the sensitizations are clinical or cutaneous, and the character of the tests employed, whether scratch, intradermal, or patch.

Bloch's theory is that certain groups of cells become capable of reacting to a given product with the formation of cellular fixed antibodies. In harmony with this theory is the fact that some hay fever patients have itching of the eyes, others have itching of the nose, and still others have the characteristic discharge of fluid from the nose without a feeling of local irritation.

W. H. Crisp.

WISDOM IN REFRACTION

What factors are we to consider as components of the refraction problem? How heavily do they weigh? How do they influence each other? What is the relation of the pure mathematics arrived at by means of refractive machinery to the final prescription? How shall we use this information? Are we in our refractions, doctors of medicine first, employing our energies for the time being on a refraction problem, or are we refractionists with an incidental M.D. tacked on to our name? If the former, we are doing good work—if the latter we may be giving accurate glasses on the basis of pure ocular measurement, and yet never quite able to understand why in spite of the accurate check-up of a dozen tests, the final test—the patient's happiness with his result—does not check up in an equally satisfactory manner. If we are the former the axis may be five degrees off, the cylinder a bit weaker than mathematically called for, the minus sphere less than machinery indicates, the plus more or less than usually called for by the rule of failing accommodation, but, if we have paid attention to certain factors apart from the machinery of measurement, and evaluated them properly, the shock of having the patient return within two days or two weeks with uncomfortable—too strong —pulling—tearing—unable to keep on —painful—blurring don't feel right—not as good as my old pair—complaints, comes at very irregular and infrequent

intervals; and is almost always due not to an axis at 177° instead of 175°, or a cylinder of .75D. instead of .87D., but to our not having evaluated factors other than the machinery of refraction fully enough.

What are these factors? Without going into a lengthy disquisition on the subject in an editorial, may I point out a few which should give us a moment's pause before writing out the prescription on purely a mathematical basis combined with the patients acceptance thereof at the time of testing?

How old is he? Does his accommodation really correspond to that age? How much use does he have to make of it? For how long at a time? Is he at work that is interesting to him or at a chore? By artificial light or not? How long have glasses been worn, for what and how? How many changes since the first pair? Why were changes called for? Did each change accomplish the object desired? What is the desired working distance? Are there several, such as demanded by the etcher, painter, architect, musician, or barber? Is the position of work upright, bent over, sitting or standing? Does distance or close vision have to alternate rapidly and often? Can objects of work all be brought into the same range or not, and so with each case at first examination. Define for yourself, what does he want, and what must he do, and how?

But first of all, look at your patient before looking at his eyes. Is he tall, thin, and asthenic, or short, solid and phlegmatic? Is it a little overworked school teacher or a well upholstered society leader? Is the face asymmetrical? Is he right or left handed? Does he slouch or sit up straight? Is she full bosomed and short armed? Is the expression peevish or placid? Is it a twitchy little youngster or a placid sweet-faced professor of Botany? The machinery may read the same for both, but the prescription may differ quite perceptibly. Is it a strapping young athlete or a worn out clerk prematurely gray, whom life has buffeted? What does his doctor say about him generally? Oh, he has a gastric ulcer, yes, and varicose veins and hemorrhoids; and the next patient, a lady—how old is her youngest child? Just two months and nursing him too? Splendid! but a lot of extra work recently, and vision was a bit blurred before the baby came, the doctor was worried, really? Well, well, now lets look at your old glasses—There is more to fishing than the fish—and more to refraction than the machinery. Hans Barkan.

BIOMICROSCOPY

It is lamentable to note that even at this date, over two decades after the introduction of the slitlamp by Gullstrand, many practitioners of ophthalmology are neglecting to avail themselves of so useful an instrument. Even more to be censured are those individuals who possess a slitlamp but allow it to gather dust in a corner because they feel that they do not have the time to learn its use properly. Some few still seem to retain the idea that it is an experimental instrument or an instrument for investigative purposes and has no application to everyday practice. So much the opposite is true that in the University eye clinic at Berlin every patient who enters the clinic with some pathological condition of the anterior segment is examined routinely with the slitlamp.

Examples of practical application of this examination are common. A few recently observed cases may be cited at random. In a cornea cut by flying glass the presence or absence of a glass splinter was speedily and accurately determined by the use of the narrow beam. It was readily decided whether hypertension was due to a chronic simple glaucoma or was secondary to a low grade uveitis by examining the posterior surface of the cornea for precipitates. By noting the cell content of the aqueous the healing of an iridocyclitis was followed and the point at which it was safe to discontinue atropin was definitely established. In medicolegal cases it was judged as to whether an opacity in the lens was caused by the immediate injury, was of congenital origin, or acquired in childhood, by the

location of the opacity with reference to the various layers of the lens. Vitreous hernia, easily seen with the biomicroscope, was a differential factor between congenital subluxation of the lens and traumatic subluxation of the lens. All of the above facts, and many more just as practical, are well kown to an habitual user of the biomicroscope.

A survey of the enormous amount of literature which has appeared in the last few years upon biomicroscopy will give one some idea of the importance with which it is regarded by the most eminent ophthalmologists of the world. Vogt's "Atlas der Spaltlampendmikroskopie des lebenden Auges," first appeared in 1921 as a small volume of one-hundred-sixty pages and at that time was regarded as the bible of biomicroscopy. This atlas is now being elaborated by him into an extensive work of three volumes, a large part of which is of practical clinical importance. The first two volumes of this new atlas have already appeared, are beautifully illustrated, and cover the cornea, anterior chamber, iris and lens.

"Die Mikroskopie des lebenden Auges," by Meesman serves as a manual of instruction in the use of the slitlamp, as a textbook to interpret the commoner findings in normal and pathological eyes, and as an atlas containing sixty-four colored plates. If one masters the material presented in this volume which was published in 1927, there remain only a few important recent observations to be learned to bring one's knowledge of biomicroscopy up to date. For those who have no reading knowledge of German, "An illustrated guide to the slitlamp," by Harrison Butler will prove invaluable to the neophyte in this field. No attempt will be made here to mention several other excellent works upon this subject, not a few of which are in French.

The progress of ophthalmology in recent years has been markedly aided by discoveries of biomicroscopy. An example of this is the correlation of epithelial and endothelial dystrophy. Painstaking study of patients with the corneal microscope and slitlamp, along with accurately kept records, will do much in the future to explain other problems concerning diseases of the anterior segment.

In addition to the injustice done patients by denying them the benefit to be derived from a careful biomicroscopic examination the ophthalmologist who does not use this instrument is losing the opportunity for an esthetic enjoyment of his practice which can be obtained in no other manner. Many finer anatomical structures and processes of disease viewed under microscopic magnification in the living eye are of amazing interest and the play of colors to be seen in an amber nuclear cataract or lens changes of a cerulean type are of a beauty long to be remembered.

M. F. Weymann.

MEDICAL EDUCATION

To every one interested in the subject of the training of physicians and in a broader sense many other matters which vitally concern medical practice the "Final Report of the Commission on Medical Education" will prove a book of unusual interest. It is perhaps unfortunate that this extremely thoughtful and able contribution should have been published almost at the same time as another report of cardinal interest to the practitioner of medicine and the general public because there is apt to be confusion between the two, especially since there was an overlapping of authors and material. The second report, on the cost of medical care, is so radical in some of its recommendations that it has received wide spread comment from both professional and lay press. The physician may be so interested in this report which concerns him so vitally, that he will overlook the other, which is probably of equal importance.

This commission on medical education was appointed by the Association of American Medical Colleges in 1924. It was financed by contributions from most of the medical schools of the United States and Canada, the American Medical Association, the Rockefel-

ler Foundation, the Carnegie Corporation and the Josiah Macy Jr., Foundation. The personnel included nineteen well known physicians and laymen.

Only a few of the phases most interesting to ophthalmologists, in this 560 page volume can be mentioned here but the entire book should be read especially by any who are engaged in teaching, though in a broad sense the whole future of the medical profession depends on how we answer the questions propounded in this report.

Following the foreword and introduction the "Public Aspects of Medicine" are discussed. The adoption of the good features in our present system of practice with those modifications which are necessary, is to be preferred to radical changes. "Unfortunately the emphasis is being placed upon present organization and the cost of medical care rather than upon the support of an adequate medical service of high quality." It is pointed out that "A large proportion of the population of most communities can pay for the costs of the ordinary illnesses encountered, but many of this group cannot or do not provide for the expensive items of serious illness." Special provision must be made for these.

Perhaps the sentence which conveys the maximum insight in the whole excellent book, occurs in the chapter in which the weakness of the system of organizations as a means of providing mass production in medical services, is stated. "These efforts are based in many instances upon the fundamental fallacy that the human being, who is the unit of the medical service, can be regarded as a uniform, standardized organism."

The subdivision into specialties has gone beyond the needs of the community, the report concludes and the specialist looks upon the patient too often from the viewpoint of his specialty. Many of the highly technical tests are not often valuable and yet are demanded by the patient in his lack of knowledge but in his desire to leave no stone unturned.

What we have often suspected is here substantiated in that "not over one-third of the expenditures for medical care is for physicians." "The amount spent each year for tobacco alone is about twice the gross income of all physicians."

Regarding sickness insurance, "Voluntary schemes have been proved to be only a stage in the development of compulsory coverage."

An encouraging feature is that "The care of indigent patients, long considered the responsibility of the physician, is coming to be regarded as a proper charge against the community. Doctors should be compensated for their work in caring for the indigent sick, although their employment by hospitals or the community is likely to bring about a modification of the present independent status which they enjoy". "It is desirable that medicine become more cooperative and less competitive." Food for much thought lies in that statement.

Much is included about specialization. "At present about thirty-five percent of recent graduates in this country limit their work to a specialty and most of them have not had a sufficiently broad clinical experience." Some guarantee of the qualifications of a specialist should be available. Beyond the special training, short courses of at least two types are needed; one intensive, at teaching centers, for those already trained and practising a specialty, and the other designed particularly to help the general practitioner. The essential training for one who desires to specialize is a period of several years as a resident in a hospital in a single field of clinical medicine." The elimination of much teaching of the specialties in the medical schools in order to permit of more basic training is advocated and as a corollary, better facilities for graduate study must be given.

A disturbing commentary on our specialty is that in the opinions of recent graduates, it stands low in the scale of efficiency in undergraduate teaching.

The elements most frequently enumerated as contributing to professional success were to their minds, "character, personality, industry and constant study".

These are only a few of the interesting topics. A very long section is de-

voted to medical education in foreign countries. Though perhaps not in full agreement with all of the ideas advanced, there can be no question but that the conclusions in general are sound and that the Report is an invaluable contribution to the subject.

Lawrence T. Post.

SYNDICATED MEDICAL ARTICLES

As a companion piece to the foregoing editorial on medical education, is a less pleasant chapter on the medical education of the public by syndicated articles published in the daily press. These articles have been appearing daily or weekly in most of the newspapers of the United States during the last few years. Undoubtedly they are read by millions of our citizens and must have an influence far beyond any other method of approach to the people, with the possible exception of that great competitor of newspaper advertising, the radio.

Much of the subject matter of these articles is good and most of it passable. In general there apparently has been a sincere effort by the writers to present truth in their comments and on the whole these articles have probably been of benefit to the public.

On the other hand there has recently been published an article on eye examinations which because of the inaccuracies and positive untruths contained in it and because of the probably large numbers of readers, should not pass unchallenged. Starting out with the statement that probably fifty percent is a conservative figure for the percentage of people suffering from defective eyes, there follows a description of the emmetropic, hypermetropic, myopic and astigmatic eyes. This is reasonably accurate. It is the following paragraph to which we would call the attention of our readers:

"The perplexing problems of eyestrain and failing vision have been given constant study by the optometrists who specialize in this very important branch of the healing arts and they deserve credit for their scientific achievements. They have perfected a technique which has stood the test of many years practice whereby "drops" are no longer necessary for a complete examination. This has been a great step forward as I am convinced that it is not only more accurate than the older method but also does not inconvenience the patient by depriving him for two or three days of the use of his eye while reading. The modern optometrist has instruments of precision with which he makes measurements of not only the range of vision but also the actual depth of focus of the eyes. He can look into and note the general health of the eye, accurately measure the actual eye curvature without touching it, and make sensitive measurements of the muscular balance and coordination of the eye."

Obviously the author, whose picture accompanies the syndicated article, is an ardent advocate of the optometrist and possibly the "Dr." which precedes his name is not that of a medical doctor.

It is well that we as ophthalmologists should be continually aware of the propagation of these doctrines. They have little importance when emanating from optometrists but when they are advanced by one who is presented to the public as a physician, they assume greater significance. The methods of combating them consist in discussions of the subject with the editors and owners of the papers publishing this material and the more extended use of press and radio to disseminate truth about ophthalmological subjects.

Lawrence T. Post.

BULLETIN OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Since the publication of the last issue of this Journal, a Bulletin has been received from the American Academy of Ophthalmology and Otolaryngology. It contains an account of the activities of that Society at the last meeting, in Montreal, with a foreword as to the purpose of the Bulletin and an interesting article on "Leadership" by Dr. W. P.

Wherry, the executive secretary of the Academy.

There have been, of necessity, so many ophthalmic conferences at the Academy meetings in the last few years that it has not been possible for a registrant to be present at more than a small part of them so that even the Academy members who have attended the meeting are not aware of all that has taken place there, while those who have had to remain away are quite uninformed about what has transpired. The Bulletin therefore is welcome as presenting an account of the meeting and other items of interest to the members. A Bulletin such as this will keep the Academy in the minds of all of its members throughout the year. It will quicken interest in the work of the organization and will serve as an organ in which to outline the plans for the succeeding meeting.

Lawrence T. Post.

BOOK NOTICES

Handbuch der gesamten Augenheilkunde, Zweite Anflage, 11 Teil, VIII Band, XI Kapitel, Nachtrag 1,498 bis 501 Lieferung. Verlag von Julius Springer, Berlin.

The particular monograph under review, "Disturbances in the motility of the eyes," is by A. Bielschowsky. The earlier parts of this monograph on disturbances of the ocular motility appeared in 1907 and 1910; the last half of the work has just been published, making in all 550 pages. To this latter half, an author-index and a subject-index of the entire work are appended. The first half of the monograph treated the sensory and motor apparatus of double vision and had proceeded far into the symptomatology of the ocular paralyses. The latter half discusses the supranuclear conjugate paralyses of the eye-muscles, the paralyses of the associated convergence and divergence movements of the eyes, the congenital disturbances of motility, the etiology of the paralyses of the ocular muscles, the prognosis of the paralyses of the ocular muscles and the therapy of the paralyses of the ocular muscles. Harvey D. Lamb.

Raul Argañaraz. Manual práctico de oftalmología (A practical Manual of Ophthalmology). See Amer. Jour. Ophth., v. 15, No. 11, p. 1081.

This book is a résumé of the lectures given at his clinic in the University of Buenos Aires, by Prof. R. Argañaraz. As his course is intended for undergraduate medical students, the diseases of the anterior segment of the eye are studied with much more detail than fundus diseases. However the latter are described in a short and clear manner, sufficient for all practical purposes.

This is the second edition of the book and has been thoroughly revised, with many figures added. The printing and illustrations are beautifully done and reflect great credit upon the high level of the graphic arts in South America. The colored figures, especially, are excellent, many of them being original. The great number of photographs of patients with different diseases shows what a large clinical material the author had at his command in doing his work.

This book is, however, more than another good text for Spanish speaking students and medical practitioners. It is a splendid contribution to medical literature in Spanish and a large step toward the emancipation from the old allegiance to foreign text books, especially French, that Spanish speaking professors have been confronted with for long years. They were compelled to use them in their teaching throughout Spain and Latin America, if they intended to have modern viewpoints.

In the last three or four decades a great movement of medical renaissance has been under way in Spanish speaking countries and its results are now evident in many branches of medicine, especially in ophthalmology, which is cultivated with great enthusiasm and success. New books as the ones recently published by Prof. Marquez of Madrid, Prof. C. Charlin, of Chile, and the one under review are good proof of this assertion.

Dr. Argañaraz's book is remarkable for its brief, clear and practical presentation of the subjects. But from the standpoint of the reviewer it is still more remarkable by the up-to-date, de-

tailed information that it contains. If a book is only a reflection of the personality and knowledge of an author, then this manual shows accurately the vast reading, the exact information and the discriminating mind of its author.

Although all chapters have the same standard of excellence, those on orbital diseases, glaucoma, crystallin lens and ocular neurology are particularly interesting, giving a clear exposition of the accepted or conflicting theories and then the author's own opinion. They have, besides excellent figures, many in colors, printed on the pages and not in separate sheets as is customary.

Although the ideas and methods of the Argentine School of Ophthalmology are expounded in detail in some subjects, the book is essentially international in scope. Perhaps a few of the statements in these chapters may be open to discussion, but as a whole the book is a trustworthy, brief and accurate account of modern ophthalmology.

It is to be earnestly hoped that books like this do not remain confined to the land of their birth, but find their way into all Spanish speaking countries. To insure this result it should be advisable to change or eliminate from the text many words and turns of expression which, although in use in Argentine, are not considered to be part of the correct stock of the language, as used in Spain and other countries.

In spite of this small defect it is certain that the book will be welcomed by all teachers of ophthalmology in Spanish, and also by practitioners desiring brief and recent information in ocular diseases. Manuel Uribe Troncoso.

CORRESPONDENCE

The transmission properties of tinted lenses

. . . I take strong exception to the comments made by W. W. Coblentz in his article entitled, "The Transmissive Properties of Tinted Lenses." (A.J.O., v. 15, no. 10.)

I have no criticism of the scientific facts of "The Transmissive Properties of Tinted Lenses." I differ, however, with the writer's intent to prejudice the value of tinted lenses, especially those of the lighter shades, based upon the observation made upon his own eyes and those of his assistant. I take it that such tests of visibility represent only those of the observer, under the assumption that his eyes and those of his assistant represent the standard eyes of the populace. It is well known that various patients who have normal vision, or visual acuity, differ greatly in their ability to outline details when measured under varying conditions of light, when measured at great distances and under varying conditions of atmospheric density. It should be remembered also that both eyes may have normal vision or what we commonly call normal vision and yet one eye can have a keener perception both of light and colors than the fellow eye. It is also known under similar conditions, two patients with normal vision will vary considerably in their estimation of glare. Some patients can tolerate glare to a great degree, while others have visual disturbances from the smallest measurable quantity of glare.

Criticising tinted lenses because of the wording of the advertisement, or because it is an advertisement in itself, seems to be characteristic of many scientists who find fault with anything that is commercial. The manufacturer who wishes to place his wares upon the market knows that his claims must be sincere and honest, otherwise his product will soon fall by the wayside. If the facts are not true, it is proper that the scientists join forces with the commercial houses in the effort to correct errors of claims, but it is wrong entirely to discredit the manufacturer merely because he is advertising.

The scientists often, in making his claims, speaks of his test tube experiments and regards them as final. We all know from a practical standpoint that scientific facts lose their scientific value when they are not practical.

I wish to state emphatically that the lighter forms of the tinted lenses serve a very valuable purpose. Many patients, particularly myopes, are intensely satisfied and grateful for the lighter tinted

lenses which give them comfort in their every day work.

There is something more than the mere transmissive properties of the lens which is a factor in reducing the discomfort caused by glare. The eyes are a part of the nervous system. They are also part of the psychic system. There is something more which affects the patient than the mere light which enters the eyes. Just as blind people feel light, so are patients psychically affected by glare, by color, by darkness, and by the clearness of the atmosphere.

What I wish to emphasize is that the transmissibility of a certain lens to light is not the whole story. Patients who are inclined to be nervous, high-strung, irritable, and affected by lights, noises, and by any external stimulation find a great deal of comfort in tinted lenses, especially the lighter tinted lenses. Children who suffer from blepharospasm are very often cured of their nervous irritability and of their car sickness when light tinted lenses are placed on the eyes, even though they are emmetropic.

Perhaps the manufacturer of tinted lenses is not aware of the fact, but he should know that certain tints allay general nervous irritability and give the patient a sense of comfort which cannot be explained by test tube experiments or by the laboratory of physics.

If we look upon the eyes as mere cameras, then Mr. Coblentz's article on "The Transmissive Properties of Tinted Lenses" will be rated as 100% in value, but as applied to human beings whose nervous systems, including the eye, vary as do the species of flowers in their reaction to light, then tinted lenses take on a new significance, namely their affect upon the complicated nervous mechanism of the human being.

Louis Lehrfeld.

Bronze plate of Professor Ernst Fuchs

I have in my office a bronze plaque upon a black wood easelstand representing a likeness of the late Professor Ernst Fuchs; it was presented to me by Professor Fuchs and his son; I prize it highly not only on account of its associations but because of its artistic merits.

The plaque measures 3″ by 4½″, and the black stand measures 4¼″ by 7¾″. Many of my ophthalmologist friends have admired the plaque and envied me on account of its possession.

When in Vienna last summer, I mentioned this to the younger Fuchs, Dr. A. Fuchs, and asked whether it was not possible to obtain some of these plaques for distribution among my colleagues. He said that duplicates could be obtained and would cost about $2.00 each.

It has occurred to me that I will be doing many ophthalmologists, who remember the late Professor Ernst Fuchs with affection and esteem, a favor when I put them in the way of obtaining this bronze likeness.

I am willing to undertake the work of ordering the required number of bronze plaques on stands, and of forwarding them to those who desire them, if they will send me their names with a request to this effect. The price of $2.00 will be increased, of course, by the expressage, broker's charges and federal customs charges; but, even with these additions, the cost ought not to be more than $5.00 or $6.00 each.

Charles H. May, M.D.
698 Madison avenue,
New York City

(Ed. The publication of this letter was delayed through a misunderstanding.)

Folia Ophthalmologica Orientalia

The first number of a new ophthalmic journal the Folia Ophthalmologica Orientalia edited by Dr. Aijeh Feigenbaum, in Jerusalem, has just been received. Excerpts from a letter relative to it follow: The journal is a trilingual publication in English, German, and French. Every article is briefly summarized in three languages. The external appearance of the first issue is somewhat similar to that of this Journal. It contains ten original articles as well as abstracts of the meetings of the various ophthalmological societies in the East.

The Folia Ophthalmologica Orientalia is intended to serve the eastern and

southern sections of the Mediterranean countries together with Mesopotamia and Persia. The periodical, appearing thrice yearly, has a threefold task: First, to centralize the production of the eastern and southern countries of the Mediterranean; second, to transmit to the scientifically interested West, the peculiarities of that part of the world and the special ocular problems that confront it; third, to become the means of establishing a middle-east ophthalmic congress for the furtherance of the study of tropical ophthalmology.

The print is excellent, the subject matter very instructive and the illustrations very good. I am sure American Ophthalmology is glad to welcome this new addition to the domain of ophthalmic literature coming as it does from a corner of the earth, although very remote, yet historically speaking very near and dear to our hearts.

Dr. Aijeh Feigenbaum, the eminent Ophthalmologist of Jerusalem, and Author of a Hebrew Ophthalmic text book "Haajin", is an indefatigable worker in the field of ophthalmology, and under his editorial guidance we feel sure the journal will succeed. New Palestine is to be congratulated in having such a faithful servant in the field of ophthalmology.

Welcome Folia.

Very sincerely yours,
Aaron Brav, M.D.

Stereoscopic charts

The publisher of my stereoscopic charts informs me that the seventh edition is nearly exhausted.

Before sending copy for the eighth edition, I would greatly appreciate samples of new cards which anyone interested has to offer. If accepted the author's name will appear on the card. This set has always been a *compilation* and its success is due in no small degree to the cooperation of those interested in fusion training.

David W. Wells, M.D.
Hotel Westminster
Boston, Massachusetts

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Evans, John. **Application of angioscotometry to the study of nasal sinus affections.** Ann. d'Ocul., 1932, v. 169, Sept., pp. 717-730.

Using a very small target and the stereocampimeter the author maps out the blind spots and retinal vessel arborizations. (The subject has been dealt with by the author in the American Journal of Ophthalmology.) It seems evident that the perivascular spaces are in relation with the general circulation, retinal metabolism, and the cerebrospinal system, and angioscotometry is of diagnostic interest. Several case reports and charts are given of ocular trouble arising from sinus disease.

H. Rommel Hildreth.

Mann, W. A. **Color photography of the fundus oculi.** Arch of Ophth., 1932, v. 8, Sept., pp. 405-408.

The difficulty with color photography of the fundus oculi in the past has been the necessity of long exposure under brilliant illumination. Using the Finley process, however, no greater light or exposure time is required than for black and white fundus photography. The expense is not excessive, as both the taking and the viewing screens may be used again and again, if carefully handled. As many positives as desired may be printed from a single negative, and black and white prints may be made from the negatives. Even color plates can be produced by means of so-called block-out screens, which separate the primary colors in a single negative into three separate positives.

M. H. Post.

2. THERAPEUTICS AND OPERATIONS

Klein, N. and Scheffer, L. **Experimental observations on the eye regarding the absorption of ointments.** Graefe's Arch., 1932, v. 128, p. 460.

The type of emulsion was found significant in the absorption of ointments. Absorption of iodine was evident only when an oil-water emulsion had been formed. A greater amount of active substance was absorbed from ointments having a small content of water.

H. D. Lamb.

Schmelzer, Hans. **Further experimental findings with the antivirus of Besredka.** Graefe's Arch., 1932, v. 128, p. 574.

Instillation and inunction of the antivirus of Besredka into the conjunctival sacs of eight rabbits was followed by the same negative results as to immunization as had been earlier attempts

with injection of the antivirus under the conjunctiva. Attempts to produce immunity of the cornea by preliminary treatment with a homologous antivirus were fruitless. H. D. Lamb.

Schmelzer, Hans. **Observations on acquired active immunity of conjunctiva and cornea.** Graefe's Arch., 1932, v. 128, p. 579.

In rabbits' eyes that had recovered from an infection of the conjunctiva and cornea with staphylococcus aureus, there was a short relative regional immunity of these tissues against this organism. H. D. Lamb.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Green, John, and Beisbarth, C. **Inexpert refraction.** Jour. Amer. Med. Assoc., 1932, v. 99, July 9, p. 101.

The work of the ophthalmologist has three simple but tremendously important objects, namely, preservation and increase of vision, promotion of comfortable functioning of the eyes, and prevention of blindness. The attainment of these objects is to be had most frequently and most certainly by careful and thorough refraction. The attitude of reluctant tolerance toward refraction cases is severely criticised. Among other reasons for inexpert refraction is the feeling of many men practicing in smaller communities that they are in direct competition with optometrists, and that to maintain their standing they are compelled to speed up the work of refraction and adopt short cuts to get the patient through in a day, in other words to lower the quality of the work to optometric level. The changes in refraction due to age, cataract, glaucoma, corneal scars are considered, and the importance and benefits of painstaking repeated tests are pointed out. The authors are firm believers in cycloplegics, even beyond the usually accepted limit of forty-five years. (Discussion.)

George H. Stine.

Jackson, E. **Aberrations of eyes and lenses.** Jour. Amer. Med. Assoc., 1932, v. 99, Aug. 6, p. 437.

The aberrations of oblique surfaces of prisms, cylinders, and spheres are discussed, and four simple, instructive experiments are described. The aberration of the eye, symmetrical (positive and negative) and irregular (scissors and pendulum movements) are described and illustrated. In spite of these aberrations, the eye is a superior optical instrument. Aberrations of lenses produced by an obliquity of ten degrees are scarcely perceptible to the eye, and only when it rises to fifteen degrees do the effects become important, amounting to one-tenth of the strength of the lens. The author maintains that rarely does one rotate the eyes more than twelve to fifteen degrees in the orbit; further rotation is obtained by turning the head in the desired direction. Further, it is possible to sustain perfectly good binocular vision for a large amount of work with the eyes without using anything like twenty degrees of rotation of the eye in the orbit. A case of almost complete bilateral ophthalmoplegia, illustrative of this fact, is cited. Perfect coflexures for a meniscus lens are impossible, the claims of optical advertisements notwithstanding. (Four figures, discussion.)

George H. Stine.

Rutherford, C. W. **Asthenopia, a psychoneurosis and a medical responsibility.** Jour. Amer. Med. Assoc., 1932, v. 99, July 23, pp. 284.

Asthenopia is defined as a syndrome in which the visual discomforts that attend prolonged close work are accompanied by feelings of fatigue and reflex manifestations remote from the eye. It can be classed as a psychoneurosis. The term eyestrain may be reserved for those cases in which visual discomforts are brought on by prolonged close work, are limited to the eyes, and promptly disappear when close work is discontinued. The management of this condition requires a searching history, a thorough examination, and a working knowledge of the psychoneuroses. (Discussion.)

George H. Stine.

Sitchevska, Olga. **Contact glasses in keratoconus and in ametropia.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1028-1038.

Tassman, I. S. **Frequency of the various kinds of refractive errors.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1044-1053.

Vita, A. **The influence of the position of the pupil upon the size of the unfocused retinal image.** Rassegna Ital. d'Ottal., 1932, v. 1, May-June, p. 353.

This is a technical paper in physiologic optics with many intricate formulæ, diagrams, and charts and not well adapted to abstracting. Vita demonstrates the importance which the points of exit (in Italian the pupil of exit) have in the calculation of the size of the retinal image in ametropia. Since the points of entrance and exit are so close to the anterior and posterior principal points, in ametropia of curvature and of accommodation, the focused image is practically equal in size to the clear image of emmetropia. In axial ametropia the images are of different size than in emmetropia, while in aphakia they are slightly larger.

Eugene M. Blake.

4. OCULAR MOVEMENTS

Beisbarth, Carl. **Hyperphoria and the prolonged occlusion test.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1013-1015.

Bonnet, Paul. **Ocular paralyses in contusions (traumatismes fermés) of the skull and of the face, their semiologic and prognostic value.** Arch. d'Opht., 1932, v. 49, Sept., p. 583.

The following classification of these lesions is suggested: (1) In contusions and fractures limited to the orbit, paralyses due to hematoma, to disinsertion of the inferior oblique (transitory), or to fracture involving the pulley of the superior oblique (may be permanent). (2) At the apex of the orbit, sensory and motor ophthalmoplegia from hematoma compressing the contents of the sphenoidal fissure, or basal skull fracture involving the optic nerve. (3) Involvement of nerves to ocular muscles in fractures of the base of the skull, by bone splintering, by hemorrhage in their bony canals, by progressive hematoma, by the concussion which affects the entire brain, or by disturbance of their nuclei.

Unilateral paralysis of the sixth nerve has been considered pathognomonic of a fracture of the tip of the temporal bone. Occurring immediately it indicates direct injury and is likely to be permanent. Appearance some hours after fracture has occurred indicates pressure from hematoma, with favorable prognosis. Bilateral sixth nerve paralysis is most often an indication of bilateral fracture of the temporal bone.

M. F. Weymann.

Duane, Alexander. **The monocular movements.** Arch. of Ophth., 1932, v. 8, Oct., pp. 530-549.

This paper, like its predecessors, is a fragment from the author's unpublished book on ocular muscles. It is so concisely written that it does not lend itself to abstraction.

M. H. Post.

Gurdjian, E. S. **Alternating oculomotor paralysis in traumatic middle meningeal hemorrhage.** Arch. of Neurology and Psychiatry, 1932, v. 28, July, p. 26.

The title of this paper seems misleading, for as applied to ocular muscles the word "alternating" commonly suggests changing from side to side, whereas the author says that alternating oculomotor paralysis, or Weber's syndrome, is characterized by palsy of the third nerve on one side with contralateral paralysis of the body. The lesion responsible for such a syndrome is located in the anterior aspects of the midbrain and involves the corticospinal path (pyramidal tract) and the fibers of the third nerve that traverse it. The author reports three cases caused by acute traumatic middle meningeal hemorrhage. The oculomotor paralysis is evidenced by ptosis, a dilated pupil, and the characteristic po-

sition and lack of motility of the eyeball. Gurdjian believes the hemorrhage in the middle fossa produces oculomotor paralysis by dissecting forward and pressing on the contents of the superior orbital fissure. Diagnosis and operative procedure in middle meningeal hemorrhage are discussed.

Ralph W. Danielson.

Payne, B. F. **Severance of the medial rectus muscle in an operation for pterygium. Reattachment.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1055-1056.

Phillips, W. H., Dirion, J. K., and Graves, G. O. **Congenital bilateral palsy of the abducens.** Arch. of Ophth., 1932, v. 8, Sept., pp. 355-364.

A case of congenital bilateral palsy of the abducens, associated with status thymicolymphaticus, came to autopsy immediately after operation. Clinically, the patient was unable to abduct either eye beyond the midline. The autopsy findings, presented in considerable detail, showed diminutive size of the sixth nucleus, due to congenital defect in development. A few scattered fibers arising from the rudiments of the nucleus could not be traced to their usual exit from the brain. The only other available pathological report of such a case substantiates these findings. Possibly many cases of bilateral abducens palsy may be similar in their etiology. M. H. Post.

Spiller, W. G. **Corticonuclear tracts for associated ocular movements.** Arch. of Neurology and Psychiatry, 1932, v. 28, Aug., p. 251.

This paper is practically a monograph on the subject. Complete study of a new case is offered. Before dying of subacute bacterial endocarditis the patient developed paralysis of associated ocular movements. Post-mortem blocks of the brain stem were studied in serial sections from the level of the abducens nuclei to the entrance of the aqueduct into the ventricle. The conclusions do not lend themselves to abstraction. Ralph W. Danielson.

Wiedersheim, O. **Photography of the paths of oscillation of both eyes with the photonystagmograph.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 341. (Ill.)

Wiedersheim started with observation of the movements of a very fine corneal reflex produced by the nystagmus diaphragm. By the nystagmus contact glass he created a magnification in order to distinguish also most minute motion. For documentary fixation of the observed paths he selected the kinematographic method in constructing his photonystagmograph. The present article presents pictures of double exposures of the eyes, which were obtained by a handy mirror for double photography. C. Zimmermann.

5. CONJUNCTIVA

Anderson, Olaf. **Lysozyme in Xerophthalmia.** Hospitalstidende, 1932, v. 75, Aug. 25, pp. 1029-1037. (See Section 14, Eyelids and lacrimal apparatus.)

El-Tobgy, A. F. **Intravenous injections of copper salts in the treatment of trachoma.** Sixth annual report, Giza Mem. Ophth. Lab., 1931, p. 119.

El-Tobgy treated twenty cases of trachoma with intravenous injections of copper in organic combination with calcium (Bayer S. W. 277). One injection was given every three days and twelve constituted a course. In most cases there appeared to be a definite improvement in the subjective symptoms, and in some cases corneal infiltrations disappeared after the first two or three injections. The palpebral lesions remained unaffected. During the treatment a number of the patients showed a reduction of from seventeen to twenty percent in the number of red blood corpuscles per c. mm. The author considers that on the whole this treatment is not so effective as purely local measures. Phillips Thygeson.

Kolen, A. A. **A simplified modification of Denig's operation.** Arch. oftalmologii, 1932, v. 8, pt. 6-8, p. 544. (See Amer. Jour. Ophth., 1932, v. 15, May, p. 458.)

Lehrfeld, Louis. **Vernal conjunctivitis.** Arch. of Ophth., 1932, v. 8, Sept., pp. 380-404.

After a rather exhaustive study the author concludes that vernal conjunctivitis has the clinical qualities of an allergy. He feels that past failures to establish an allergic etiology have been due to lack of sensitivity of the hitherto known tests. He has found the most satisfactory treatment to be frequent lavage of the conjunctival sac with any simple solution. M. H. Post.

Mitchell, H. L. **Pemphigus of eyes, nares, pharynx, and larynx.** Virginia Med. Monthly, 1932, v. 59, Aug., p. 302.

At the age of forty-seven years the patient developed pemphigus of the eyes, nares, pharynx, and larynx. After many complications she finally succumbed at the age of fifty-one years. (Seven references.)

Ralph W. Danielson.

Pillat, A. **The origin and function of conjunctival pigmentation in avitaminosis of adults as well as the connection of avitaminosis with the adrenals.** Graefe's Arch., 1932, v. 128, p. 361.

The author discusses further the findings reported in a previous paper (Graefe's Arch., 1931, v. 127, p. 575). He repeats the previous conclusions that the conjunctival pigment in avitaminosis arises from the protoplasm of the conjunctival epithelial cells; and that the purpose of the newformed pigment is to protect from sunlight the epithelial cells whose metabolism has been disturbed by deficiency of vitamin A.

In the present article, it is pointed out that the new formation of pigment to protect from sunlight would not explain all of the pigment produced. The formation of the pigment caps in the distal ends of the epithelial cells near the nucleus could perhaps be explained on the ground that here were located the mitochondria from which under definite mechanical, nervous, and hormonal stimuli the pigment was manufactured. In long continued and severe cases of avitaminosis in adults, in addition to pigment formed in the basal epithelial cells, we are perhaps dealing with pigment derived from the adrenals. This latter production of pigment would indicate disturbance of these glands of internal secretion, arising only in advanced stages of avitaminosis. H. D. Lamb.

Rötth. **The etiology of trachoma.** Graefe's Arch., 1932, v. 128, p. 381.

The Prowazek bodies are not the result of cell degeneration nor due to reaction in the cell. They were found in fifty percent of the cases having trachoma for five years, but also not infrequently in those of twenty to fifty years standing. In one hundred percent of cases with inclusion blennorrhea and inclusion conjunctivitis, the Prowazek bodies were found during the first weeks.

The author refutes every statement that the chlamydozoon is an unqualifiedly saprophytic microorganism, protozoon, or modified Bacterium granulosis. H. D. Lamb.

Schmelzer, Hans. **Experimental studies and clinical findings with the antivirus of Besredka.** Graefe's Arch., 1932, v. 128, p. 447.

In the author's experiments with rabbits, no local protection of the conjunctiva was produced by preceding subconjunctival injection of the antivirus of Besredka. In the clinic, on the other hand, it was observed antivirus therapy was followed by considerable improvement in chronic blepharoconjunctivitis from staphylococcus aureus. It can therefore be recommended in those cases of chronic blepharoconjunctivitis which prove refractory to the usual therapy. H. D. Lamb.

Stelling, Karl. **A radical remedy for trachoma.** Graefe's Arch., 1932, v. 128, p. 678.

About thirty-five years ago the author noted complete disappearance of a skin cancer at the nasal canthus, following an attack of erysipelas. A bouillon culture of the organisms in an erysipelas vesicle was inoculated into the

conjunctivas of a patient with old trachoma and very pronounced pannus. Three days later erysipelas had developed, but this ended on the ninth day. The conjunctivas of the eyelids were then found entirely smooth and of normal appearance, and the pannus had greatly diminished. The author has not had an opportunity to try the treatment again. He feels however that erysipelas is not too dangerous to use as a therapeutic agent.

H. D. Lamb.

Stewart, F. H. **Analysis of acute and chronic conjunctivitis cases examined for Prowazek-Halberstaedter bodies.** Sixth annual report, Giza Memorial Ophthalmic Laboratory, 1931, p. 107.

Stewart examined 116 cases of conjunctivitis for the presence of Prowazek-Halberstaedter bodies. He was able to find definite Prowazek bodies in no one of thirty-eight cases of uncomplicated trachoma. These were found only in complicated trachoma and with one exception only in cases complicated by Koch-Weeks infection. While the author does not conclude that the inclusion bodies are definitely related to the Koch-Weeks bacillus he refers to the previous work of Williams and of Bengtson, which suggests that these bodies are of bacterial origin.

Phillips Thygeson.

Strebel, J. **Symptomatic treatment of hay fever.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 372.

Strebel recommends internally ephetonin (Merck) in tablets of 0.05 gm., twice a day, and calcium gluconate Sandoz, with locally percainal Ciba as the best prophylactic and therapeutic nasal salve. From his observations with the slitlamp he attributes the itching of the eyelids to allergic conjunctivitis, which produces minute epithelial vesicles. These burst, their membranes dry, and as very fine scales irritate the endings of the fifth nerve. A solution of boric acid with adrenalin 1 to 1000 and a few drops of novocain or percain is recommended as an eye water.

C. Zimmermann.

Wilson, R. P. **Further observations on experimental and clinical studies carried out in the village of Bahtim (near Cairo).** Sixth annual report, Giza Mem. Ophth. Lab., 1931, p. 88.

Experimental work has been carried on in this village of 3500 inhabitants by Wilson and associates since 1929. In previous reports they have demonstrated that most infants showed definite clinical manifestations of trachoma before they were a year old and in the majority of cases before they had reached the age of nine months. Now the authors confine their attention to the corneal changes with particular reference to incipient pannus. From their findings they conclude that trachoma is invariably associated with pannus and that this lesion is not a late manifestation nor a complication of trachoma but an essential part of the disease. In five out of sixty-three cases studied definite elongation of the limbal vessels was observed just before the appearance of follicles on the tarsus. Mild or acute conjunctival catarrh, when uncomplicated, appeared to have no influence on the vessels, but incipient pannus was often noted at or almost immediately after the appearance of tarsal follicles indicating trachomatous disease. The authors also found that pannus incipiens could appear without antecedent acute infection.

Phillips Thygeson.

Wilson, R. P. **Report on a mission to investigate trachoma in the United States.** Sixth annual report Giza Mem. Ophth. Lab., 1931, p. 98.

Wilson visited the United States in the summer of 1931. At the Rockefeller Institute he examined a number of the monkeys in which a granular conjunctivitis had been induced by Bacterium granulosis. He states that the lesions appeared no different from those which he had produced in Egypt by tissue transfer from a monkey infected with Bacterium granulosis and sent from the United States. He noted that the monkey disease bore little or no resemblance to human trachoma of stage 1.

At Albuquerque, New Mexico, and at Fort Defiance, Arizona, he studied cases of trachoma in Indians and concluded that although the Indian disease appears to differ slightly in certain clinical aspects from trachoma in the Orient it must nevertheless be considered true trachoma. In Denver he studied culturally material from six Indian and four white cases. From these he isolated twenty strains of small gram-negative rods. Five of the strains differed but slightly from Bacterium granulosis in biological characters but could be differentiated by serological tests. Two strains of Bacterium granulosis were later recovered from samples of these bacteria left at the Rockefeller Institute.

Wilson found the conditions under which the Indians live in the southwest to be almost identical with those of the fellahin of Egypt. They are very poor, their dwellings are of mud, they live in thickly populated communities and the surrounding country is semiarid, sandy, and dusty.

Phillips Thygeson.

Wilson, R. P. **Treatment of trachoma with chaulmoogra oil and copper sulphate.** Sixth annual report, Giza Mem. Ophth. Lab., 1931, p. 94.

Chaulmoogra oil and copper sulphate used alternatively have been very definitely effective in the treatment of trachoma. The combination of the two in ointment form appeared to give results slightly superior to those obtained when the two were used separately.

Phillips Thygeson.

6. CORNEA AND SCLERA

El-Tobgy, A. F. **Tattooing of the cornea with platinum chloride.** Sixth annual report, Giza Mem. Ophth., Lab., 1931, p. 123.

El-Tobgy has had excellent success in using Krautbauer's method of tattooing the cornea with platinum chloride and hydrazinhydrate. The method gives a glistening jet black appearance applicable especially for central leucomas, but since most Egyptians have deeply pigmented irises excellent cosmetic results were obtained regardless of the site of the scar. The author points out that there is little danger to the eye even in adherent leucomata and that successful results have been obtained even in degenerate scars. Where atheromatous changes have taken place it is advisable to perform a preliminary scraping and to treat subsequently with scarlet red ointment to obtain a healthy growth of epithelium before tattooing is attempted. Occasionally, when a scar is irregularly facetted, the epithelium at the bottom of the facet may not be entirely denuded at the time of operation, with resultant spotting of the tattooed area. This may be easily corrected by repeating the operation for the affected area; it not being necessary to wait for the epithelium to heal. In some of his first cases El-Tobgy found, after the eyes had quieted down, faint whitish rings around the tattooed areas. He states that in order to avoid this it is necessary to denude at operation a slightly wider area than appears necessary to the naked eye. He believes that the results will be permanent since some of the original cases under observation for two years have shown no change in appearance.

Phillips Thygeson.

Fage. **Variability of forms of herpes of the cornea.** Arch. d'Opht., 1932, v. 49, Sept., p. 578.

It is believed that the branched keratitis of Hansen Grut, dendritic keratitis of Emmert, disciform keratitis, and ulcerative keratitis in radiating furrows as described by Gillet are different manifestations of herpetic infection of the cornea. It is even possible that the superficial punctate keratitis of Fuchs is also herpetic. Dendritic and disciform keratitis have been experimentally produced in animals with herpes virus. Two cases are reported to illustrate the transition of a simple herpes of the cornea into a dendritic type of keratitis. M. F. Weymann.

Gundersen, Trygve. **Germicidal effect of ultraviolet rays on the virus of herpes: experimental studies.** Arch. of Ophth., 1932, v. 8, Oct., pp. 519-529.

Extensive experimental work on rabbits to determine the value of ultraviolet light in herpetic keratitis is reported by the author. He concludes from these experiments that herpes virus cannot be destroyed by any exposure to ultraviolet rays that could practically be used in the human eye. He further feels that the use of fluorescein in no wise increases the generalized action of the ultraviolet rays in herpes of the cornea. M. H. Post.

Kuchner, Karl. **Histologic findings in purulent scleritis.** Graefe's Arch., 1932, v. 128, p. 675.

In a seventy-year-old man a swelling the size of a pea developed in the lower and temporal part of the sclera, 5 mm. from the limbus. In eight days it opened and drained thin pus. Because of severe pain, the eye was enucleated several days later. Histologic examination showed, in addition to a trachomatous pannus, the connective tissue fibers of the sclera pushed apart by pus cells at the site of the main swelling. One or two larger and several small, partly confluent foci of pus cells were present. The choroid on the side opposite to the swelling had been detached from the sclera. H. D. Lamb.

Wilson, R. P. **Slitlamp study of corneal vessels in Egyptian trachoma.** Sixth annual report, Giza Mem. Ophth. Lab., 1931, p. 110.

Following Vogt's method, the limbal vessels are divided into three more or less distinct zones, first the peripheral palisade zone, second the zone of vascular loops, and third the very narrow zone of end capillary loops. The first two zones may vary greatly in width but the latter remains astonishingly constant in normal cases. Whenever this zone is widened the cornea may be considered pathological. In trachoma, where definite scarring of the tarsus has occurred, there are always long new vessels in the cornea even though there may be no marked change in the transparency of the cornea. Sometimes cases of healed trachoma are seen which present no tarsal scarring and in which the cornea is clear when examined with the loupe. The slitlamp appearance of the end capillary loop zone in these cases is of very definite diagnostic value. The zone no longer appears as a narrow delicate fringe. The meshwork of vessels is much more open, the loops are elongated, the caliber of the vessels is enlarged and irregular, and the edge of the zone is less regular than normal. In any doubtful case this appearance is extremely suggestive of a previous mild trachomatous infection, since it has been found to occur in no other conjunctival disease.

Phillips Thygeson.

Zitting, Erna. **Investigations on the sensibility of the cornea in trachoma.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 301.

Seventy-three eyes with trachomatous pannus were tested. The trachomatous process diminishes the sensibility of the whole surface of the cornea, mostly within the area of pannus formation proper, but also in the clear parts which clinically appear normal. The diminution of sensibility is more marked the thicker and more extensive the pannus and the longer trachoma has existed. The disturbances of sensibility persist after the trachoma has been cured. C. Zimmermann.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Gradle, H. S., and Ackerman, W. **Reaction time of normal pupil.** Jour. Amer. Med. Assoc., 1932, v. 99, Oct. 15, p. 1334.

Using cinematographic means, the author found that in normal young blue-eyed persons the pupil reacted at the following rates: (a) On illuminating the eye, there was a latent period of 0.1875 second. (b) This is followed by a primary contraction of the pupil lasting 0.4365 second at the rate of 5.48 mm. per second. (c) There then came a secondary contraction lasting 0.3125 second at the rate of 1.34 mm. per second. (d) When the illumination was removed the pupil started to dilate at

the rate of 0.95 mm. per second. These data tend to corroborate the view that dilatation of the pupil is due to tonicity of iris tissue alone and not to muscular action of the dilator pupillae. (Four figures, discussion.) George H. Stine.

McGuire, H. H. **Gyrate atrophy of the choroid and retina (Fuchs).** Arch. of Ophth., 1932, v. 8, Sept., pp. 372-379. (See Section 10, Retina and vitreous.)

Rehsteiner, Karl. **Acute accumulation of cholesterin in the anterior chamber.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 291. (Color plate.)

The right eye of a girl of fifteen years had become blind at the age of three years after a contusion. Lately the eye had been inflamed and painful and the anterior chamber had gradually filled with cholesterin crystals. On account of persistent pain the eye was enucleated. The histological examination is presented in detail. The case was peculiar in that the cholesterin crystals accumulated in a few weeks under the author's eyes free from any admixture of blood or exudation, and filled the anterior chamber. The crystals either originated in the detached retina in hemorrhages from which they were flushed forward, or came directly from the blood stream into the vitreous and aqueous. The cholesterin in the blood was diminished, the lecithin increased, in analogy with Schaaf's investigations on blood fats in xanthomas of the skin. C. Zimmermann.

Terrien, F. **The clinical value of heterochromia of the iris.** Arch d'Opht., 1932, v. 49, Sept. p. 545.

After a short historical sketch a classification of heterochromia of the iris is suggested.

A case is reported to illustrate the complicated type of heterochromia. The lighter eye in a girl of eighteen years was found to have fine precipitates on the posterior surface of the cornea, pupils slightly miotic, slight narrowing of the palpebral fissure, and no external evidence of inflammation in the affected eye. In these individuals there is undoubtedly a mild serous iridochoroiditis, but the precipitates on the cornea never become so dense as those in tuberculosis or syphilis, and they often disappear after operative opening of the anterior chamber. The problem of the mechanism of heterochromia is in no wise settled but in the complicated type it appears to be very definitely linked with lesions of the sympathetic. M. F. Weymann.

Vogelsang, K. **Sympathetic ophthalmia.** Med. Klin., 1932, v. 28, July 22, p. 1040.

The author describes briefly the causes of sympathetic ophthalmia, and advises as to treatment. He stresses the necessity for studying the relationship to tuberculosis. Beulah Cushman.

8. GLAUCOMA AND OCULAR TENSION

Elschnig, A. **Designation of tonometrically ascertained ocular tension.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 289.

Elschnig, for several reasons which are discussed, considers determination of degree of intraocular tension in millimeters instead of in indicator readings absolutely impractical. He thinks that the expression of tonometer values in a fraction whose numerator records the weight employed in Roman numbers and whose denominator records the indicator reading in Arabic figures is alone justified. Pressure values in millimeters of mercury ought only to be given if the intraocular tension is exactly determined with the manometer of Wessely. C. Zimmermann.

Gapeev, P. I. **Ergotamin in the treatment of glaucoma.** Archiv Oftalmologii, 1932, v. 8, pt. 6-8, p. 563.

Ergotamin, a preparation which, according to Thiel, lowers intraocular tension, was used by the author in ten cases of glaucoma, with the following results: In acute inflammatory and in absolute glaucoma ergotamin was entirely ineffective, while in simple glaucoma it seemed to increase the action of miotics. No untoward effects were observed when small doses (0.005 of ergotamin tartrate in hypodermic injection, or 0.001 in tablet by mouth) were given. M. Beigelman.

Hamburger, Carl. **Acute glaucoma and acute inflammation (silver nitrate stick).** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 366. (Ill.)

Inflammation of the eye tends to lower intraocular tension. Hamburger, seeing in this inflammation the softening principle in the treatment of glaucoma, decided to apply silver nitrate stick at the corneal margin. Four cases with good results are reported in detail. The author recommends this treatment if operation is refused and when a chronic inflammation is to be made acute. C. Zimmermann.

Holth, S. **Vertical limbal or oblique extralimbal incision for iridencleisis in glaucoma.** Arch. of Ophth., 1932, v. 8, Oct., pp. 489-494.

This paper is written as an elaboration of the author's operation of iridencleisis. He objects to the vertical limbal incision because of the large size of the conjunctival flap, with the subsequent large area of subconjunctival scar tissue, the close juxtaposition of the iris with the limbal conjunctiva, the cystoid scars which unavoidably follow, and the subnormal tension which is apt to develop. His own operation, done with the lancet, has the following merits: (1) The subconjunctival scar tissue is very small. (2) The anterior superficial valvelet covers the iris, which is protected not only by the conjunctiva but by the superior lip of the sclera wound, even in acute glaucoma where the incision is made close to the limbus. (3) The posterior deep valvelet, on the other hand, protects the ciliary body from injury. (4) The tension falls slowly. (5) Expulsive hemorrhage is very unlikely to occur. The author notes that the great success of iridectomy in the early days was probably due to the difficulties of technique resultant upon performing operations without an anesthetic.

M. H. Post.

Lobeck, Erich. **Blood-groups and glaucoma.** Graefe's Arch., 1932, v. 128, p. 620.

As to their blood grouping were investigated 70 patients with primary glaucoma, 75 normal individuals, and 74 with diseases other than glaucoma. The cases of primary glaucoma were not found to belong to any single blood group but were scattered among the four groups, in about the same percentages as with the glaucoma-free control cases. Thus evidence of close connection between definite blood grouping and hereditary tendency to primary glaucoma was not afforded.

H. D. Lamb.

Spaeth, E. B. **Iris inclusion operation in the eye of the rabbit.** Arch. of Ophth., 1932, v. 8, Oct., pp. 550-567.

Histologic study of the eye of the rabbit following iris inclusion operations aimed to solve, if possible, the following problems: (1) the rôle of the iris epithelium in filtration; (2) the rôle of the iris stroma and endothelium in filtration; (3) the histologic appearance of the bleb at various periods after operation; (4) the anatomic and mechanical reasons for a filtration cicatrix. The author finds that the iris epithelium is absolutely essential toward maintaining a permanent fistula, that it is better for the epithelial layer to lie outward and to be conserved as much as possible. The appearance of the bleb and fistulas at various stages varies little according to whether iris inclusion, anterior sclerectomy, or corneoscleral trephining is employed, but the decrease in intraocular tension depends in all cases upon obtaining a pigment-lined cicatrix. M. H. Post.

Tyson, H. H. **Nevus flammeus of the face and globe.** Arch. of Ophth., 1932, v. 8, Sept., pp. 365-371.

The case reported was associated with glaucoma, vascular changes in the iris, and a calcified vascular growth in the left occipital lobe of the brain, accompanied by right homonymous hemianopia. The association of glaucoma with nevus flammeus is rare, but of far greater interest is the presence of the calcified vascular growth, a condition, according to Cushing and Bailey, noted in the literature only three times. This growth was probably a congenital

vascular growth which lost its vitality and became calcified. M. H. Post.

Vogelsang, K. **Glaucoma.** Med. Klin., 1932, v. 28, July 15, p. 1005.

Vogelsang outlines the treatment of glaucoma, and advises the use of retrobulbar injections of alcohol in the blind painful glaucomatous eye for which enucleation is contraindicated.

Beulah Cushman.

9. CRYSTALLINE LENS

Clapp, C. A. **The effect of x-ray and radium radiations upon the crystalline lens.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1039-1044.

Cullom, M M. **Speculum for cataract extraction.** Jour. Amer. Med. Assoc., 1932, v. 99, Oct. 8, p. 1252.

This instrument consists of a stop speculum attached to a rotary bar, which is in turn attached to a metal headband similar to that of a head mirror. The bar is further stabilized by a half-circle metal band, going behind the head, and attached to the lower end of the bar. After the speculum is inserted, a set screw on the headband permits the speculum to be lifted away from the eye to the point where the patient cannot exert the slightest pressure on the eyeball. The instrument is adjustable to any size head and the speculum can be made to take the right position by simply sliding the headband to and from the eye. (Two figures.)

George H. Stine.

Gifford, S. R. Lebensohn, J. E., and Puntenny, I. S. **Biochemistry of the lens: 1. Permeability of the capsule of the lens.** Arch. of Ophth., 1931, v. 8, Sept., pp. 414-440.

These authors present a summary of their experimental work upon the permeability of the capsule. Their conclusions may be summed up in the statement that "any theory of the genesis of cataract based on increased permeability of the capsule would seem to be without foundation."

M. H. Post.

Goldmann, Hans. **Experimental observations on the genesis of heat cataract.** Graefe's Arch., 1932, v. 128, pp. 413 and 648.

Characteristic opacities at the posterior suture were produced in the rabbit's lens by simple chronic raying of the iris with small doses of heat rays. Direct raying of the lens with similar-sized doses produced no cataract. Changes in the iris were very slight when weak doses of the rays had been employed. Thus the posterior lens opacities produced by heat rays in the pigmented eye arise from the iris. The iris is first brought to a higher temperature through heat rays and convection; and this heat is then transferred to the lens-surface by contact.

In a rolling mill, where heat cataract had been observed, the body temperature of the worker usually rose to more than one degree above normal, and frequently rose to 38 degrees Centigrade. Other factors must however be necessary for the production of heat cataract, since not all workers with this occupational hyperthermia develop cataract.

H. D. Lamb.

Schläpfer, Hans. **Further observations on late contusion rosette of the lens, with consideration of rudimentary forms.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 346. (Ill.)

Seven cases are described in detail with slitlamp illustrations. The rosette may be total or rudimentary in single sectors, which, however, are so characteristic that the traumatic genesis of the opacity is forced upon anyone who has once seen it. The patients regularly report a severe contusion in early youth, and this form of cataract after contusion is undoubtedly more frequent in the young than in adults. Not rarely, when the history does not suggest the fact, concomitant traumatic changes of the iris are found. C. Zimmermann.

Siegrist, A. **The pathogenesis and medicinal treatment of senile cataract.** Ann. d'Ocul., 1932, v. 169, Sept., pp. 696-703.

Endocrine disturbances are regarded as responsible for senile cataract, tox-

ins being formed that influence the lens through the capsule. The author produced deep lens changes by the gradual introduction of napthalene into the system, in distinction from the subcapsular type of cataract produced by acute napthalene poisoning. An endocrine preparation, paraphakin, is said to have arrested cataract development in seventy-two out of seventy-four cases.

H. Rommel Hildreth.

Vannas, M. **Clinical and experimental investigations on the anterior parts of the vitreous, especially after intracapsular extraction of the lens.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 318. (Ill.)

Vannas reports examinations with slitlamp and Czapski's corneal microscope of 249 eyes operated upon for cataract at Elschnig's clinic (154 intracapsular); and experimentally of human and pig's eyes enucleated after removal of cornea and lens within the capsule. The surface of the vitreous of the enucleated eyes consists of a very thin limiting membrane. If this is incised the wound edges retract in folds and become thicker and more opaque. Herniae of the vitreous after intracapsular extraction of the lens are termed simple if the limiting membrane is intact, or complicated if it is torn, by oozing of vitreous on the surface of the iris into the anterior chamber. A characteristic case is related, in which the intact membrane was thickened and impermeable from inflammatory deposits leading to complete seclusion of the pupil with hypertension, and in which the herniae had speedily retracted. With the slitlamp, after intracapsular extraction, the opinion was confirmed that the so-called retrolental space does not lie outside the vitreous but constitutes the foremost part of it. Seven cases of displacement of the pupil after intracapsular extraction are described, in four due to remnants of pupillary membrane, in the others to complicated hernia of the vitreous or the intact anterior limiting membrane.

C. Zimmermann.

10. RETINA AND VITREOUS

Abraham, S. V. **Chorioretinitis juxtapapillaris.** Arch. of Ophth., 1932, v. 8, Oct., pp. 503-518.

This is the first histological report of this condition. The left eye was removed after a diagnosis, concurred in by many ophthalmologists of experience, of sarcoma of the choroid. The left eye was first involved, the right eye four years later. The right eye yielded to treatment, so that when last seen the eye was in fairly good condition. Clinically, the case corresponds with the important features of Jensen's earlier report. The author concludes that the initial changes lay in the choroid, and that the retinal changes are easily explainable as the result of congestion and edema following detachment, with later organization and hemorrhage. He feels that the initial process was inflammatory, due to infection or intoxication chiefly involving the temporal half of the circle of Zinn, and that, while the anterior segment of this eye was not involved, there is no reason to suppose that such involvement may not occur. M. H. Post.

Atkinson, W. S. **Retinitis punctata albescens.** Arch. of Ophth., 1932, v. 8, Sept., pp. 409-413.

Brother and sister suffered from this unusual disturbance, characterized by distribution of uniformly small, white dots about the central portion of the fundus, apparently deep in the retina or in the innermost layers of the choroid. In these two cases, on second examination three years after the original observation the dots had disappeared. Both cases reported improvement of vision after dusk, though sixty percent of all cases reported in the literature apparently suffered from night blindness. M. H. Post.

Baurmann, M. **Observations as to temperature of the galvanocautery in Gonin's operation.** Graefe's Arch., 1932, v. 128, p. 503.

The author's findings confirm those of Wessely, namely, that the deep effect of the electrocautery is much less than

that of the Paquelin; the reason for this being the much smaller mass of the electrocautery and the fact that no more cauterizing action is produced by increase of the electric current where the platinum loop has already cooled off. H. D. Lamb.

Clay, Grady. **Angioid streaks of the retina and pseudoxanthoma elasticum.** Arch. of Ophth., 1932, v. 8, Sept., pp. 334-354.

From seven cases of this interesting condition the author deduces that the uniformity of arrangement of such streaks can be explained only on an anatomical basis. He suggests that they may be the result of thrombosis of anomalous short posterior ciliary veins corresponding to the normally found short posterior ciliary arteries; and that they must be located in the choroid rather than in the retina. Such thrombosis would be a mechanical result of increase in fibrous tissue, or of degeneration of the elastic tissue of the sclera. This latter possibility is suggested by the frequent incidence of pseudoxanthoma elasticum of the skin in the cases studied by the author.

M. H. Post.

Gallenga, R. **Contribution to the knowledge of the ocular lesions in Paget's disease.** Rassegna Ital. d'Ottal. 1932, v. 1, May-June, p. 401.

Gallenga describes a case of unilateral peripapillary retinal edema in a woman subject to an advanced stage of Paget's osteitis fibrosa. A good description of Paget's disease is presented. (X-ray pictures.)

Eugene M. Blake.

Lindner, K. **A new method of operation for retinal detachments with retinal defects at the posterior pole of the eye.** Graefe's Arch., 1932, v. 128, p. 654.

In two patients with retinal detachment and hole at the macula, extensive canthotomy, incision of the conjunctiva along its reflection from the eyeball, division of the lateral rectus muscle in one case and the superior rectus muscle in the other, and blunt dissection of Tenon's capsule were done. Measuring back from the limbus 24 mm. in the one case and 28 mm. in the other, a knife was thrust through the sclera. Next a spatula-like flattened canula with openings at the side was inserted between sclera and choroid and 0.01 c.c. of six percent potassium hydroxide was injected. In the second case, vision had improved from hand motions to 6/60 and normal field six weeks after operation. The author is now performing in all cases of retinal detachment this subchoroidal cauterization which he calls his undermining method. With its use fewer trephinings in the sclera are necessary. H. D. Lamb.

Lobeck, Erich. **Observations on the significance of retinal tears in retinal detachment.** Graefe's Arch., 1932, v. 128, p. 513.

In the rabbit, retinal tears were produced with retinal detachment by drawing up the vitreous into a syringe with a large needle and maintaining the suction as the needle was slowly withdrawn; if the suction was not continued as the needle was slowly withdrawn, no tear occurred in the detached retina. Among thirty rabbit eyes, detachment of the retina with a tear was produced twenty-two times and detachment without a tear eight times. The detachment without a tear returned to place spontaneously so that it was no longer visible with the ophthalmoscope after seven days. In the eyes having a retinal tear with detachment, no spontaneous healing occurred during the thirteen days duration of the experiment, and in only five cases did reapposition of the detached retina occur. In these five cases healing of the retinal tear included adhesion between the margin of the retinal tear and the choroid.

From experiments with India ink injected into the vitreous, it appeared that through the artificial production of retinal detachment with tear, an essential change in the flow of intraocular fluids was established: fluid was taken up by the choroidal capillaries, exposed by the detached retina. More persistent diminished intraocular tension in retinal

tear with detachment is attributed to greater drainage of intraocular fluids through the extensive system of choroidal capillaries. H. D. Lamb.

McGuire, H. H. **Gyrate atrophy of the choroid and retina (Fuchs).** Arch. of Ophth., 1932, v. 8, Sept., pp. 372-379.

The case lacks certain salient features of the disease as described by Fuchs, yet appears to fall in this category. A boy of eleven years came because of reduced vision, which was corrected to normal by minus spheres and cylinders. The fields showed slightly irregular concentric contraction. The blind spots were slightly enlarged. There was no night blindness. The media were clear, the discs appeared normal. In the midzone, numerous fine granular changes, resembling miliary choroiditis, were seen, and in the extreme periphery there was a broad zone of irregularly shaped choroidal atrophies, separated by normal, though deeply pigmented, tissue. Here and there on the white areas clumps of pigment cells had been deposited, not resembling, however, those found in retinitis pigmentosa.
M. H. Post.

Raadt, O. L. E. **The pathogenesis of albuminuric retinitis.** Graefe's Arch., 1932, v. 128, p. 673.

The concentration of ammonia in the edematous fluid of nephrosis is three hundred times greater than in normal blood. The purpose of the ammonia is to form an alkali reserve to combat the uncompensated renal acidosis. The ammonia however is an exceptionally powerful cell poison, because it dissolves fat; it has therefore a strong affinity for the lipoid-rich nervous system. The treatment for nephritic retinitis would therefore be an adequate supply of alkali, preferably the alkaline salts of citric acid. H. D. Lamb.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Inhász-Schäffer, Alexander. **Retrobulbar neuritis from apiol intoxication.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 361.

A girl of nineteen years took twenty capsules of apiol in twenty-four hours. Soon menstruation set in, and also a dermatitis. Five months later she took a smaller dose as an emmenagogue. After a month she suddenly could not see well with her left eye, on account of acute retrobulbar neuritis, but under diaphorectic treatment vision returned after a month. Although considerable time elapsed between taking the poison and the eye trouble, a connection between the two seemed probable. In the cases of apiol poisoning so far known the affection has consisted in paralysis and atrophy of the muscles of the leg and hand. It is still undecided to which constituent of apiol the toxic action is to be ascribed. C. Zimmerman.

Thies, Oskar. **Neuritis retrobulbaris (Leber) and the endocrine system.** Graefe's Arch., 1932, v. 128, p. 664.

A man of twenty-four years had had the vision of each eye reduced to counting fingers at 1.5 m., by retrobulbar neuritis. Since an endocrine disorder seemed to be the cause of the eye trouble, he was put on a liver diet with a testicular and a new anterior lobe preparation. After eleven months of this treatment, the vision of the right eye was 9/10 and that of the left eye with correction was 4/10 to 5/10. Constitutionally also the patient improved considerably, becoming more masculine.
H. D. Lamb.

Vogelsang, K. **Diseases of the optic nerve.** Med. Klin., 1932, v. 28, Sept. 2, p. 1242.

The author reviews the different ophthalmological pictures of the optic nerve, including pseudoneuritis, choked disc and optic neuritis; and discusses etiology and the use of decompression.
Beulah Cushman.

12. VISUAL TRACTS AND CENTERS

Jelsma, F., Spurling, R. G., and Freeman, E. **Absence of occipital lobe of brain (porencephaly) with essentially normal vision.** Arch. of Neurology and Psychiatry, 1932, v. 28, July, p. 160.

The term porencephaly should be re-

served for brain substance defects that communicate with the ventricular system and are covered on the outside by the arachnoid. An eleven-year-old boy had had birth trauma with convulsions for a time. At the age of ten years he developed epilepsy. At operation a large porencephalic cyst of the left occipital region was found. Convalescence was uneventful and a month later there was a moderate homonymous defect in the right field with visual acuity normal. The patient had normal binocular vision. (Three figures and five references.) Ralph W. Danielson.

13. EYEBALL AND ORBIT

Brobeck, V. H. **Pulsating exophthalmos.** Amer. Jour. Ophth., 1932, v. 15, Nov., 1054-1055.

Campbell, J. L., and Martin, J. D. **Pulsating exophthalmos: treatment by partial ligation of internal carotid.** Jour. Amer. Med. Assoc., 1932, v. 99, Nov. 12, p. 1683.

A case of traumatic pulsating exophthalmos following a severe blow on the head without demonstrable fracture of the skull was treated eight months after injury by partial occlusion of the internal carotid artery with a fascial band. A drop of six heart beats per minute following digital compression of the common carotid artery (as first described by Branham) bore out the authors' opinion that they were dealing with an arteriovenous communication. Cessation of pulsation, of thrill, and of bruit after ligation aided in establishing the fact. It is now five years since the partial occlusion in this case and there has been no recurrence of thrill, bruit, or pulsation. (Two figures.) George H. Stine.

Delord, E., and Viallefont, H. **A case of intermittent exophthalmos.** Ann. d'Ocul., 1932, v. 169, Sept., pp. 730-744.

A middle-aged man began having this condition in the right eye in August, 1931. He was first seen in January, 1932, at which time the attacks had increased to almost daily, lasting from a few to ninety minutes. The exophthalmos was non-pulsating, non-reducible; the globe was fixed during the attack. A temporal bruit was heard but none in the globe. Visual function was not disturbed and the fundus appeared normal except for slight enlargement of the vessels. The general physical and laboratory examinations, history, and family background did not explain the case. Compression of the carotid relieved the condition, and repeating this in the course of a month brought about a cure. The proposed diagnosis is arteriovenous aneurism of the carotid.

H. Rommel Hildreth.

Naffziger, H. C., and Jones, O. W., Jr. **Surgical treatment of progressive exophthalmos following thryoidectomy.** Jour. Amer. Med. Assoc., 1932, v. 99, Aug. 20, p. 638.

Exophthalmos may recede, remain stationary, or actually progress after thyroidectomy. The authors hold that the exophthalmos of exophthalmic goiter is of mechanical origin, due to edema and intense swelling of the extraocular muscles. For cases of progressive exophthalmos with marked accompanying symptoms they advise operative treatment, upon the principle of decompression of the orbit and optic foramen in order to give adequate space for the increased orbital contents and the constricted optic nerve. In brief, the surgical procedure consists of reflecting bilateral frontal flaps, elevating the dura of the frontal lobe, unroofing the orbit, and removing the upper portion of the optic foramen. The orbital fascia and the ring of Zinn are opened widely. Preliminary to the operation roentgen studies are made to determine the height and extent of the frontal sinus and the projection of the ethmoid and frontal sinuses into the orbital plate. Views of the optic foramina reveal the immediate relationship of the sphenoid sinus to them so that the operation may be conducted in such a way as not to open these calls. For the first three or four days following the operation, the exophthalmos increases, but gradual recession of the globes follows, the improvement continuing over many months. In six patients the results have been gratifying. (Nine figures, discussion.) George H. Stine.

Pletneva, N. A. **An obscure case of bilateral exophthalmos.** Archiv Oftalmologii, 1932, v. 8, pt. 6-8, p. 559.

This case is reported because of the enormous degree of the exophthalmos (3.6 cm. of the right eye and 5.4 cm. of the left one); and because of failure to establish the nature of the disease, in spite of the fact that the condition had existed for twenty-six years and had been studied repeatedly by a number of European ophthalmologists. The onset of the exophthalmos, in 1906, was gradual and painless. In 1916 the vision in the right eye was lost because of corneal ulceration. A tarsorrhaphy performed the same year on the left eye had preserved until recently satisfactory vision in this eye. A biopsy of the orbital contents in 1918 revealed no definite pathologic changes. Evidence of optic atrophy (from orbital pressure) was found in the left eye in 1930. In the systemic condition of the patient there were some indications of endocrine disorder: sexual impotence, female type of hair growth, hypoglycemia, lowering of vascular tonus. M. Beigelman.

14. EYELIDS AND LACRIMAL APPARATUS

Anderson, Oluf. **Lysozyme in Xerophthalmia.** Hospitalstidende, 1932, v. 75, Aug. 25, pp. 1029-1037.

In treating twin babies who were affected by xerophthalmia, the author made investigations to determine the amount of lysozyme in the tears. He collected lacrimal secretion from the two babies by means of capillary tubes and titrated the fluid to determine the concentration of lysozyme. In the one case, in which the disease was severe and keratomalacia had already developed, the titer was very low, the reaction occurring at a dilution of 1 to 320; in the other case, in which xerophthalmia of the conjunctiva only was present, the titer read 1 to 640; while in tears of normal babies the reaction took place at a dilution of 1 to 2560. The lysozyme concentration of the tears in both cases increased rapidly after administration of substances rich in vitamin A and reached normal in the severer case in seven days and in the other in five days. The severer case developed ulcers of the corneas with final perforations, but in the milder case the xerophthalmia disappeared rapidly. In these two cases of xerophthalmia the author established a marked decrease of concentration of lysozyme in the tears.

D. L. Tilderquist.

Biondo, M. d'A. **Blepharochalasis and the climacteric.** Rassegna Ital. d'Ottal., 1932, v. 1, May-June, p. 378.

Biondo describes a case of blepharochalasis appearing in a subject of premature senility with hypothyroidism and hypopituitarism. With the involutional dysfunction of the sex glands there is associated a lack of equilibrium of other ductless glands. The author considers such polyendocrine disturbances the cause of the eye condition. Blepharochalasis is thus linked with the other skin disturbances occurring at the time of the climacteric. The author establishes histologically the picture of lid relaxation with idiopathic cutaneous atrophy, Herxheimer's dermatitis, and other dermatological lesions.

Eugene M. Blake.

Fazakas, Alexander. **Successful operation of unusually extensive symblepharon.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 380. (Ill.)

A case is reported in which the lower lid was broadly adherent to the eyeball, including the lower third of the cornea. After temporal and nasal canthotomies to the orbital margins the lower lid was separated from the globe and the tough cicatricial plate on its inner surface detached, turned like a leaf of a book, and sewed with catgut to the lower orbital margin, thus creating a fixed cicatricial ledge. The upper ocular and fornical conjunctiva was undermined as far as to the palpebral portion. A piece of buccal mucous membrane, one and one-half of the size of the surface to be covered, was transplanted to the lower lid and fastened with five sutures each to the border of the lid, to the cicatricial ledge, and, on the globe, to the sclera and the broadened tendinous insertion of the

inferior rectus muscle at the region of the equator. The mobilized upper bulbar and fornical conjunctiva was now pulled down over the cornea and fastened with two sutures, penetrating the mucous membrane, to the lower exposed part of the sclera. After five or six days, when the conjunctiva had become adherent to the wound surface, it was cut at the border of its free and attached portions. C. Zimmerman.

Gifford, S. R. **The Machek operation for ptosis.** Arch. of Ophth., 1932, v. 8, Oct., pp. 495-502.

Operations for ptosis may be divided into three groups. In the first an attempt is made to shorten or advance the levator, usually with dissection of a portion of the tarsus. In the second a portion of the superior rectus is united with the upper lid. In the third an attempt is made to utilize the action of the frontalis muscle for elevation of the lid. The author describes an operation falling in the third group. An incision is made through the skin and orbicularis muscle about 3 mm. from and concentric with the lid margin, and terminating about 3 mm. from the external and internal canthi. A second incision is made concentric with and 3 or 4 mm. above the first, and extending 2 mm. farther toward either canthus. The strip of skin and muscle is then divided at the center of the lid. The epithelial surface is treated with trichloracetic acid and then scraped, in order to completely remove the epithelium. Tunnels are made under the skin of the upper lid to the inner and outer angles of the brow above, and by means of sutures the preformed skin and muscle flaps are drawn up through these subcutaneous passages, brought out at the upper margin of the eyebrow, and anchored at this point over heavy sutures. The amount of shortening should be somewhat more than ultimately desired. During the healing of the wounds, the author recommends a dressing suggested by O'Brien. It consists of a shallow cone of x-ray film cleansed of its emulsion, bound at its margins with adhesive tape, shaped so as to fit the orbital margin, and fastened so as to form a practically air-tight covering. This dressing maintains the moisture of the cornea and is worn for at least a week after the operation.
M. H. Post.

Hartmann, K. **Blepharochalasis with goiter and double lip.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 376. (Ill.)

A girl of twelve years presented typical blepharochalasis (atrophy and folding of the skin of the upper lids, incipient atrophy of the fascia with prolapse of orbital fat), which had started at her tenth year. There was uniform hyperplasia of the thyroid gland, bulging of the upper lip, and duplicature of its mucous membrane. Excepting chronic cystitis there were no general disorders, especially not of the thyroid gland. The case gave no clue to the etiology of this rare and interesting syndrome, which suggests a general constitutional cause, possibly endocrine. The blepharochalasis was remedied by operation, and the histological description of the excised pieces is given.
C. Zimmermann.

Junès, E. **The operation of choice in trachomatous entropion of the upper lid. Low tarsotomy and horizontal sutures.** Ann. d'Ocul., 1932, v. 169, Sept., pp. 704-717.

The title suggests the author's conclusions. This is a detailed discussion and criticism of the various procedures for this condition. Anterior approach gives best exposure. Low tarsotomy provides adequate mobility of the tarsal margin without a difficult and complicated dissection. Horizontal sutures secure the tarsal margin firmly during healing, without cutting, disturbance of circulation, or other disadvantages of vertical sutures.
H. Rommel Hildreth.

Sitschew, A. I. **On the treatment of purulent dacryocystitis by metal retention probes.** Archiv Oftalmologii, 1932, v. 8, pt. 6-8, p. 648.

During his thirty-two years of work in the northeast of Russia, where purulent diseases of the lacrimal sac are common, the author encountered about 5000 cases of dacryocystitis. His routine

treatment of these cases is as follows: Through a small incision below the internal palpebral ligament, a probe is used to render the duct passable; then a 1 mm. metal probe is introduced into the canal and is left there with its upper end bent so as not to permit it to slip downward. The probe is kept in this position for several weeks. The results are excellent, and in very few cases are more radical procedures necessary.

M. Beigelman.

15. TUMORS

Dimissianos, Bas. **Diagnostic difficulties of carcinoma metastasis in the eye.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 356.

Carcinoma metastases in the eye are rare. So far 132 cases have been recorded. They mostly invade the posterior segment of the uvea, only exceptionally the ciliary body and iris. Almost always the diagnosis was wrong or reserved when the first ocular symptoms appeared in persons in whom carcinoma was not yet suspected. Two cases after carcinoma of the breast, one after total extirpation of the uterus, and one after carcinoma of the parotid are described in detail. C. Zimmermann.

Doherty, W. B. **Ocular papillomata.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1016-1021.

Moulton, H., and Moulton, E. C. **Sarcoma of the choroid: six cases with early operation.** Jour. Amer. Med. Assoc., 1932, v. 99, Aug. 6, p. 460.

Of the six cases reported, three were cured; two patients were living and well fifteen and twenty-seven years respectively after early enucleation. There were three deaths from metastasis, one year and ten months, four years and eight months, and nineteen years after operation respectively. All of the patients who lived had tumors of the small spindle-cell type, one of which was a leucosarcoma. In the fatal cases two tumors were of the round-cell type, and one was a small spindle-cell sarcoma. The authors infer that metastasis may occur after the earliest enucleations; and even as late as nineteen years afterward. Metastasis may occur with any type of cell, but the round cell type is the most malignant. In the authors' series cures were fifty percent, which agrees well with Hill Griffith's estimate, except that his time limit was only three years, which the authors believe too short. (Six figures and discussion.)

George H. Stine.

16. INJURIES

Beery, E. M. **Intraocular foreign body with Bacillus Welchi infection.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1022-1024.

Kubik, J., **The technique of diascleral removal of pieces of iron imbedded far back in the sclera.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 316.

The center of the cornea showed a perforation, and the anterior pole of the opaque lens a rupture from which swelling lens matter projected. Daily attempts with Haab's giant magnet during the next five days were of no avail. Extraction of the cataract on the sixth day left remnants, which after a few days were removed by suction through a lateral incision. The ophthalmoscope revealed the splinter in a whitish mass close to the macula, and attempts with the magnet during examination showed it to be slightly movable. Ultimately a cyclodialysis spatula was introduced in the direction of the foreign body through a suprachoroidal pocket (without injuring the vitreous), and then the bent tip of Hirschberg's magnet at once brought out the fragment. The patient made a good recovery, with corrected vision of 3/30. There was an absolute central scotoma and a sector shaped scotoma upward and outward corresponding to a hemorrhage in the retina.

C. Zimmermann.

Livingston, P. C. **The study of sun glare in Iraq.** Brit. Jour. Ophth., 1932, v. 16, Oct., p. 577.

This is a comprehensive study of the influence of the component parts of the solar spectrum upon the eyes. Consideration of glare as it concerns various vocations is discussed. Experimental tests of light sense, accommodation, visual

acuity, perimetry, relation to pulse response, diet factors, color of the eyes, are expressed by graphs, charts, and tabulations. Three cases are cited. Field charts and a bibliography accompany the contribution. The investigator concludes that the full glare of the hot season is productive of objective signs of ocular fatigue. Fatigue of accommodation and of convergence are almost universal. Reduced light sense and threshold is exceedingly common. Visible ophthalmoscopic changes do not occur. Color of eyes is unimportant. Use of antiglare glass is a valuable protective measure. D. F. Harbridge.

Miescher, G., and Wiesle, P. **Is there an inurement of the eye to ultraviolet light?** Graefe's Arch., 1932, v. 128, p. 472.

Both the clinical and histologic findings definitely indicated that the unpigmented conjunctiva and cornea of the rabbit's eye did not become accustomed to short-wave ultraviolet light. This was explained by absence of a light-screening horny layer in these ocular coverings. In the iris no structural changes were found except hyperemia, even with considerable irritation of the cornea, an indication that in the doses employed no appreciable amount of ultraviolet light had passed the cornea. Injury to the lens was not found in any case. H. D. Lamb.

Riedl, Franz. **A case of maximal traumatic cyclodialysis.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 296. (Ill.)

A man aged forty-six years accidentally pushed the handle of an awl into his left eye, causing extensive cyclodialysis, complete detachment of the ciliary body from its insertion and displacement toward the equator, equatorial rupture of the sclera and choroid, and subluxation of the lens. The diagnosis was determined by examination of the angle of the anterior chamber according to Salzmann's method.

C. Zimmermann.

Spackman, E. W. **X-ray diagnosis of double perforation of the eyeball after injection of air into the space of Tenon.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1007-1012.

17. SYSTEMIC DISEASES AND PARASITES

Armstrong, R. M., and Kavanaugh, C. N. **Primary ophthalmic tularemia.** Southern Med. Jour., 1932, v. 25, July, p. 749.

A general discussion of the disease is followed by five case reports. In the one case which proved fatal, the report of the pathologist on removed tissue indicated that microscopically the conjunctiva and cornea were covered with a heavy layer of lymphocytic and polymorphonuclear infiltration surrounding multiple foci of early caseous necrosis which entirely replaced the epithelium. Areas of focal necrosis were found scattered throughout the spleen, liver, lungs, and regional lymph nodes.

Ralph W. Danielson.

Lutkevitch, A. G., and Pokrovski, A. I. **Ocular complications in chicken-pox.** Archiv Oftalmologii, 1932, v. 8, pt. 6-8, p. 533.

Fine scars in an otherwise normal conjunctiva may result from ocular complications in the course of chicken-pox. In a case of varicella the conjunctiva became the seat of a vesicular and ulcerative affection with the subsequent formation of scar tissue. A review of the literature brings out the multiplicity of ocular involvements in chicken-pox: from slight vesicles on the surface of the skin to gangrene of the eyelids, from a mild iritis to metastatic endophthalmitis, and from epithelial defects in the cornea to a severe purulent keratitis. The possibility of ocular palsies and of optic neuritis in the course of chicken-pox is also mentioned. The modern conception of varicella as of a disease related to herpes zoster finds indirect corroboration in the identity of type of ocular lesions occurring in the two conditions. M. Beigelman.

Marquez, M. **Concerning hydatid cyst of the orbit.** Arch. d'Opht., 1932, v. 49, Sept., p. 565.

Iceland and Argentina are countries

in which hydatid cysts are most frequent. Three new observations are reported, two illustrated by photographs. The first patient was a forty-year-old veterinarian with a hydatid cyst found in the lower portion of the left orbit. A 1:1000 solution of mercury bichloride was injected into the cyst, but it later refilled and the lining had to be extirpated. The second case, in a four-year-old infant, was diagnosed as sarcoma of the orbit and hydatid cyst was found at operation. The third patient had marked exophthalmos with corneal lesions, and later had a hydatid cyst removed. In a fourth observation the diagnosis of hydatid cyst was made without paracentesis, skin and complement fixation tests being positive and eosinophilia present; but a sarcoma was found at operation. It is recommended that the diagnosis be made primarily by exploratory puncture, and secondarily by the skin and complement fixation tests.

M. F. Weymann.

Mayer, L. L., and Rony, H. R. **Visual fields, blind spots, and the optic discs in endocrine diseases.** Amer. Jour. Ophth., 1932, v. 15, Nov., pp. 1024-1028.

Terskih, V. I. **Ocular lesions in the epidemic of leptospirosis in Dmitrovsk.** Archiv Oftalmologii, 1932, v. 8, pt. 6-8, p. 580.

Five hundred and fifty-two cases of leptospirosis were diagnosed in the county of Dmitrovsk during the four years 1927 to 1930. The leptospira isolated from the blood and obtained in pure cultures morphologically resembled the spirochete of Weil's disease. Many of the patients complained of visual disturbances and in five cases floating vitreous opacities were found. These ocular complications were observed about two weeks after the onset of the disease.

M. Beigelman.

Williamson-Noble, F. A. **The reactions of the eye to general disease.** The Lancet, 1932, v. 222, June 18, p. 1293; June 25, p. 1345; and July 2, p. 4.

These three papers comprise the Lettsomian lectures given before the Medical Society of London in February and March, 1932. They review textbook material, recent theories and discoveries, and the author's opinions gleaned from long experience. The first lecture considers the lens, tuberculosis, high blood pressure, classification of vascular anomalies, albuminuric retinitis, and diabetic retinitis. The second deals with measles, reactions of the iris and ciliary body, focal infection, and syphilis. The third paper discusses retinal changes in anemia, the optic nerve, retrobulbar neuritis, papilledema, and optic atrophy. (Several figures and thirty-four references.)

Ralph W. Danielson.

Young, R. H. **Neurologic features of pernicious anemia.** Jour. Amer. Med. Assoc., 1932, v. 99, Aug. 20, p. 612.

Five hundred and fifteen cases of pernicious anemia were studied, and tabulation of ophthalmoscopic observations in the cases with combined sclerosis showed that out of eighty-seven cases only ten yielded evidence of retinal hemorrhage. It was observed that patients with pernicious anemia and a well marked psychosis almost invariably had retinal hemorrhages. There appeared to be no relationship between the presence of retinal arteriosclerosis and the development of cord changes. Optic atrophy was seen in two cases. There was one case of sixth-nerve palsy and two of seventh-nerve palsy. Nystagmus was found in three of the cases and nystagmoid movements were not uncommon.

George H. Stine.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Bader, Alfred. **Friedrich Horner in letters of his friends.** Klin. M. f. Augenh., 1932, v. 89, Sept., p. 383. (Ill.)

The one hundredth anniversary of the death of the celebrated Swiss ophthalmologist Friedrich Horner prompted Bader to read this interesting collection of letters before the Swiss Ophthalmological Society as a valuable supplement to Horner's biography.

C. Zimmermann.

Dupuy-Dutemps, L. **Charles Abadie (1842-1932).** Ann. d'Ocul., 1932, v. 169, Sept., pp. 689-695.

A biography. (See Amer. Jour. Ophth, 1932, v. 15, Dec., p. 1211.

Friedenwald, H. **The progress of ophthalmology.** Jour. Amer. Med. Assoc., 1932, v. 99, July 16, p. 187.

This interesting and instructive historical address does not lend itself to abstraction. George H. Stine.

Lacat, C. **In memory of Dr. Ch. Abadie.** Arch. d'Opht., 1932, v. 49, Sept., p. 600.

This is a brief description of the life and outstanding characteristics of Dr. Abadie by one of his devoted disciples.

M. F. Weymann.

19. ANATOMY AND EMBRYOLOGY

Rones, Benjamin. **Development of the human cornea.** Arch. of Ophth., 1932, v. 8, Oct., pp. 568-575.

The author calls attention to the fact that two views have been held with regard to the development of the human cornea. From a number of specimens from the collection of the Carnegie Embryological Institute of Washington, he traces the detachment of the lens vesicle from the surface epithelium, the ingrowth of mesoderm between the two, and the subsequent invasion of mesoderm between the surface epithelium and the first mesodermal layer, to form the corneal stroma.

M. H. Post.

NEWS ITEMS

News items in this issue were contributed by Drs. G. Oram Ring, Philadelphia, and M. F. Weymann, Los Angeles. News items should reach **Dr. Melville Black, 424 Metropolitan building, Denver,** by the twelfth of the month.

Deaths

Dr. Willard G. Reynolds, Brooklyn, aged sixty-six years, died October twenty-seventh, of heart disease.

Dr. Wallace Curtis Dyer, Evansville, Indiana, aged fifty-two years, died October twenty-fifth, of heart disease.

Dr. William H. Schutz, Kansas City, Mo., aged sixty-one years, died October twenty-ninth, when his speedboat capsized.

Dr. Morris H. Boerner, Austin, Texas, aged forty-seven years, died, June twenty-sixth, of an incised wound of the throat, self inflicted.

Miscellaneous

Under the will of Dr. William Lambert Richardson, $50,000 was bequeathed to the Perkins Institution and Massachusetts School for the Blind.

Perhaps no author's name is more frequently misspelt than that of Miss Ida A. Bengtson, of the United States Public Health Service. Not only the printer, but even the most literary and accurate of writers on the subject of trachoma (especially in the English language) insist on calling her "Bengston."

A trust fund of $10,000 was created in the will of Mrs. Julia Spencer Smith of Philadelphia to be administered by the Temple University to establish awards for research in ophthalmology. At the end of ten years the trustees may continue it, or terminate it and apply the principal to laboratory work. Under the will $5000 was left to endow a free bed in the Wills Hospital.

Brig. Gen. Frank T. Hines, administrator of Veterans' Affairs, states that among some 14,000 veterans hospitalized during August last, eighty-five percent of the disabilities were not of service origin and that, of the World War group in hospitals under the direction of the Veterans' Administration in October, sixty percent were suffering from conditions not traceable to war service.

The annual mid-winter course in ophthalmology and otolaryngology to be held in Los Angeles January 16-27, inclusive, 1933, will have as lecturers in ophthalmology Dr. John Weeks, Dr. Bernard Samuels, Dr. Sanford Gifford, Dr. Joseph McCool, and Mr. E. B. Burchell. The lecturers in otolaryngology will be Dr. John Barnhill, Dr. Joseph Beck, and Dr. Stacy Guild. The principal didactic course will include treatment of progressive myopia by Dr. Weeks; histopathology of the eye by Dr. Samuels; various procedures in ophthalmic therapeutics by Dr. Gifford; conditions of the ocular muscles and their treatment by Dr. McCool; bacteriology of the eye by Mr. Burchell; cadaver dissection and otolaryngologic operative procedures by Dr. John Barnhill; histopathology of the ear, nose and throat by Dr. Beck; and the results of investigations upon the inner ear by Dr. Guild. In addition to the didactic portion of the program, there will be diagnostic and operative clinics by the various lecturers mentioned above and members of local hospital staffs. The fee for the entire course will be fifty dollars, twenty-five payable upon registration and twenty-five upon arrival in Los Angeles. Those desiring a detailed printed program may obtain the same from the Secretary of the Research Study Club of Los Angeles under whose auspices the course is to be given. Address Dr. Don Dryer, 2007 Wilshire Boulevard, Los Angeles, California.

The new Wills Eye Hospital in Philadelphia, the largest institution in America devoted exclusively to the treatment of eye diseases was dedicated on Saturday afternoon, November 12. It has been built as the successor of the old hospital located at 18th Street and the Parkway, which is to be demolished to make room for a new Temple of Music. The new building is situated on the northwest corner of 16th and Spring Garden Streets and is modern in every respect.

City officials, distinguished physicians and many prominent laymen attended the dedication ceremonies. The exercises were presided over by Mr. Ernest T. Trigg, Chairman on Wills Hospital of the Board of Directors of City Trusts. Appropriate addresses were made by the Mayor of the city, Honorable J. Hampton Moore, by Mr. Trigg and by Dr. J. Milton Griscom, executive surgeon of the institution. The architect of the building, Mr. John T. Windrim, formally presented the keys of the new institution to the President of the Board of City Trusts, Honorable Francis Shunk Brown. Dr. Paul J. Pontius of the hospital staff, in the name of the consulting and attending surgeons, presented a silver cup to Mr. Stephen Wiersbicki, the most efficient superintendent.

Since the founding of the institution nearly a century ago, upwards of eight hundred thousand persons have been treated. The new institution contains about two hundred free beds.

A number of private rooms have been made available for the use of members of the staff who can now, for the first time, utilize the hospital for the appropriate treatment of their private patients.

During recent years the medical staff has been enlarged by the election of a distinguished group of physicians representing allied branches of medicine, in order that the association of ophthalmology with general systemic diseases may be adequately studied. Provision in rooms

and equipment has been carefully made for all such work.

Ophthalmologists of standing in the city of Philadelphia will be permitted to utilize the private rooms and will constitute a Courtesy Staff.

Chiefs of Clinics: Dr. Burton Chance, Dr. J. Milton Griscom, Dr. Frank C. Parker, Dr. B. F. Baer, Jr., Dr. Thomas A. O'Brien, and Dr. Leighton F. Appleman.

Associated Clinics: Roentgenology, Dr. Bernard P. Widmann; Pathology, Dr. Perce deLong; Refraction, Dr. Isaac S. Tassman; Dental, Dr. Gustav C. Tassman; Oto-Laryngology, Dr. William F. Whelen; Laboratory of Ophthalmology, Dr. Alfred Cowan; Dermatology, Dr. Joseph V. Klauder; Neurology, Dr. Theodore H. Weisenburg; Medicine, Dr. Hugh McC. Miller.

The New York Ophthalmic Hospital and the New York Eye and Ear Infirmary each received $5000 under the will of the late Edward Guthrie Kennedy.

The Pierre I. Chandeysson Electric Company of St. Louis has presented to the St. Louis University School of Medicine a very powerful giant magnet which is practically six feet in length. It was presented as a memorial to the late Col. Ernest G. Bingham. Col. Perry L. Boyer, successor to Dr. Bingham, gave the presentation address.

Dr. Harvey J. Howard resigned from the professorship of Ophthalmology in Washington University, in St. Louis in November. Dr. Lawrence T. Post was appointed acting head of the department.

Societies

Dr. Park Lewis of Buffalo delivered the annual address to the National Society for the Prevention of Blindness, December 1, at the Russell Sage Foundation Building, New York City. His subject was the "Prevention of Blindness and Conservation of Sight as a Cooperative Project."

The Section on Ophthalmology of the College of Physicians of Philadelphia met on Thursday, December 15. The program was as follows: Dr. H. Maxwell Langdon and Dr. Jas. E. Aigner, D.D.S., by invitation, "Fracture of Maxilla Through Left Optic Foramen. Reduction with a Kingsley Splint with Restoration of Vision." Dr. Burton Chance, "Extraction of Lenses Containing Foreign Bodies." Dr. Geo. E. deSchweinitz, "Some Observations of Superficial Punctate Keratitis." Dr. Perce deLong, "Metastatic Carcinoma of the Choroid." Dr. Louis Lehrfeld, by invitation, "Sodium Carbonate in the Treatment of Vernal Conjunctivitis."

The Kansas City Society of Ophthalmology and Otolaryngology held its December meeting on the second and third of the month at Rochester, Minnesota, where an extremely diversified program was given by the staff of the Mayo Clinic. Forty-one members of the society attended.

The Sixty-Ninth Annual Meeting of the American Ophthalmological Society will be held at The Mayflower, Washington, D.C., May 8-10, 1933, in conjunction with the meeting of the American Congress of Physicians and Surgeons.

The topic chosen for the 1933 meeting of the Association for Research in Ophthalmology is "The Etiology of Senile Cataract." The tentative program is as follows:

1. Chemistry of the Lens, Cecil S. O'Brien, M.D. and P. W. Salit, Ph.D., Iowa City, Iowa.
2. Metabolism of the Normal and Cataractous Lens, Peter C. Kronfeld, M.D., Chicago, Illinois.
3. The Etiology of Cataract as Determined by Slitlamp Studies, Arthur J. Bedell, M.D., Albany, New York.
4. The Mechanism of Senile Cataract, interpreted in Terms of Etiology, Daniel B. Kirby, M.D., New York, N.Y.
5. Possible Influence of Immunological Reactions in Senile Cataract Formation, Alan C. Woods, M.D. and Earl L. Burky, M.D., Baltimore, Maryland.
6. Investigations of the Pathogenesis of Black Cataract, Sanford R. Gifford, M.D. and Irving S. Puntenny, M.D., Chicago, Illinois.
7. Water Equilibrium in the Normal and Cataractous Lens, James E. Lebensohn, M.D., Chicago, Illinois.

After the 1933 meeting, there will be no set topic. Original research papers will be acceptable and six will be selected for presentation for each meeting. The time limit for presentation of each paper, including the demonstration of lantern slides, will be forty-five minutes.

Personals

Drs. Dean, Samuels, Jackson, Buffington and Burchell were guests of the South Texas Graduate Assembly which met on November 28-December 1, at Houston, Texas.

At the annual meeting of the South Dakota Health Officers' Association in Huron, October fourth, Dr. Charles E. Yates of the U. S. Indian Service gave an address on "Trachoma Among the Indians of South Dakota."

Dr. and Mrs. Wm. Campbell Posey of Philadelphia spent the summer on the Italian Riviera. Their daughter, Miss Hadassah H. Posey will remain abroad this winter to study at the Sorbonne in Paris.